LIBRARY

TELEPHONE ENGINEER

WITH WHICH IS CONSOLIDATED THE WESTERN TELEPHONE JOURNAL

Vol. IV CHICAGO, SEPTEMBER, 1910 No. 3

SOMETHING NEW UNDER THE SUN

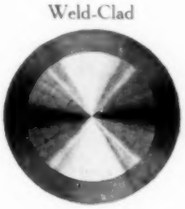
In order to introduce dead soft annealed Copper-Clad Steel Tie Wire, a new product manufactured by this company, we will furnish without charge a sufficient amount to tie in each order of bare line wire received by us up to October 1st, 1910.

This is the perfection of tie wire, owing to its strength and pliability. The former makes it possible to use a tie smaller than the line, and the latter assures a grip that effectually prevents trembling or burning.

After accepting, with our compliments, your first lot of Copper-Clad Steel Tie Wire, you will continue to use it because it is

THE BEST TIE WIRE

Weld-Clad



Trade Mark

Duplex Metals Company

Monadnock Bldg., Chicago

Singer Building, New York

WESTON WIRE CHIEF'S VOLTMETER

FOR ACCURATE TESTING

REQUIRED IN TELEPHONE EXCHANGES

The design of this instrument makes it specially suitable for the following tests:

Continuity of Line — **Resistance**
Short Circuits — **Insulation and**
Grounds — **Capacity Measurements**

The WESTON Wire Chief's Voltmeter is an instrument developed with special reference to the requirements of Telephone Companies. With it a Wire Chief is able to make rapidly and accurately a large number of tests and handle with the highest possible efficiency the miscellaneous trouble peculiar to telephone work.

This instrument possesses the same features of durability and workmanship which have made the WESTON permanent magnet moving coil instruments the standards for all kinds of Switchboard, Laboratory and Testing service. WESTON Electrical Measuring Instruments are manufactured in extensive lines of high grade and low priced types for all commercial circuits and all classes of service.

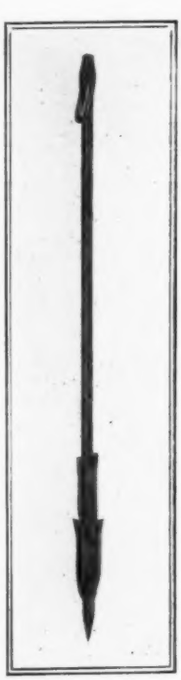
The many classes of WESTON Instruments are the result of 22 years of experience in the Art of Electrical Measurement and the manufacture of Electrical Instruments.

Write for catalogues which give complete information.

WESTON ELECTRICAL INSTRUMENT CO.

New York Office: 114 Liberty St. **Main Office and Works: Waverly Park, Newark, N. J.**

San Francisco: 682-684 Mission St. **London Branch: Audrey House, Ely Place, Holborn.**
Paris, France: E. H. Cadiot, 12 Rue St. Georges. **Berlin: Weston Instrument Co., Ltd., Ritterstrasse No. 88**



HARPOON

THE ALL-STEEL

GUY ANCHOR

A sledge and a man to swing it—the full equipment for installing. Set by tightening guy wire.

Pierces or turns aside buried obstructions and can be driven wherever there is space to receive the point.

Sample anchor free to accredited purchasing agent of any company having poles to anchor.

WRITE FOR CATALOGUE

CROUSE-HINDS COMPANY

SYRACUSE, N. Y.

NEW YORK 30 Church St. | CHICAGO 303 Dearborn St. | CINCINNATI 234 W. Fourth St.

Telephone Engineer

WITH WHICH IS CONSOLIDATED

The Western Telephone Journal

ESTABLISHED 1902

VOL. IV — CHICAGO, SEPTEMBER, 1910 — NO. 3

PUBLISHED MONTHLY BY THE

ELECTRICITY MAGAZINE CORPORATION

ELECTRICITY MAGAZINE CORPORATION

ED J. MOCK and PAUL H. WOODRUFF, Editors.

MONADNOCK BUILDING, CHICAGO.

LONG DISTANCE TELEPHONE: HARRISON 3014.

EUROPEAN OFFICE.....36 Maiden Lane, Covent Garden, London
S. RENTELL & CO., Representatives.

Entered as second-class matter May 26, 1909, at the postoffice at Chicago, Illinois, under Act of March 3, 1879.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico.....Per year, $2.00
Canada.....Per year, 2.50
Foreign countries within the Postal Union.....Per year, 3.00
Single Copy.....20

NOTICE TO ADVERTISERS.

Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, the first day of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements can not be shown until the appearance of the edition containing it.

NOTICE TO SUBSCRIBERS.

REMITTANCES.—Remittances should be made by check, New York draft or money order, in favor of TELEPHONE ENGINEER. Foreign subscriptions may be remitted direct by International Postal Money Order, or sent to our London office.

CHANGE OF ADDRESS.—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

CLUB RATE.—In acknowledgment of assistance rendered by subscribers in the securing of new orders, a club rate of $1.50 per annum is quoted. This rate applies to new subscriptions in clubs of two or more.

Copyrighted, 1910, by ELECTRICITY MAGAZINE CORPORATION.

CHICAGO, SEPTEMBER, 1910.

TABLE OF CONTENTS.

Editorial 97-100
Telephone Courtesy in Chicago. By H. N. Foster..... 101-103
Salesman or Solicitor? By George L. Willman..... 103-105
Tests on Anglo-French Cables 105
Improvements in Picture Telegraphy. By Dr. Alfred Gradenwitz..... 106-108
Spokane Interstate Acquires Big Property 108
Chesapeake Bay's Submarine Cable. By Francis O. Marden..... 109-110
Dictating Letters by Telephone 110
Who's Who in the Telephone Game 111-112
Telephones for British Antarctic Expedition 112
Vail on London Telephones 112
Telephone Exchange Directories. By Will M. Traer and J. E. Magly 113-114
Early Telephone Delevopment. By W. H. Gunston..... 114-115
The Law and the Telephone. By E. J. Wenner..... 115-116
Methods of Interior Block Distribution. By Irwin Johnson..... 117-119
Morgan Making Valuations 119
What One Woman Thinks. By Sarah Elizabeth Brown..... 120-121
Recent Telephone Patents. By David S. Hulfish..... 122
Making Hard Rubber for Telephone Uses. By F. S. Malm..... 123-125
Observations on American Systems. By Major W. A. J. O'Meara..... 125-126
Nebraska Bell Answers Attorney General 126
Department of Railway Telephones 127-135
Of Interest to the Trade 135-140
Kalispell New Common Battery Exchange..... 135-136
Universal Test Clip in Demand 136
New Western Electric Headquarters in Milwaukee..... 137
Speed in Filling Orders 138
Inspecting and Testing Telephone Sets. By E. A. Hawkins..... 139-140
Chicago Subway making Progress..... 140
Brevities of the Business 140-142

REACHING OUT.

IN purchasing and consolidating *The Western Telephone Journal* with TELEPHONE ENGINEER, we have added strength to our position to serve the readers of both magazines. Besides this, we are offered an excuse to tell something of the progress of both publications—what they stood for and how they fared.

Telephone men all over the country recall the launching of the *Iowa Telephone Journal* in August, 1902. Stanley S. Lichty, secretary of the Corn Belt Telephone company, and a prominent figure at telephone conventions, with a gift for gab and an itch for publicity, was responsible for the idea. He put the thought up to Will M. Traer, a printer in his town and the deed was done. Lichty being a buyer of considerable telephone apparatus, stalked among the makers of it and dragged in the advertisements, and Traer, being more than an average printer, staid at home and issued the publication. The scheme worked—the *Iowa Telephone Journal* boomed. Every telephone man in Iowa subscribed.

Lichty got rheumatism in his left leg, which made him limp a bit, but he hobbled into the adjoining states and got more subscribers. The state associations made his magazine their official organ, until the list grew so long it was not printed for want of space. Occasionally he picked up an order for a few thousand toll tickets or some blanks. The business grew. Lichty kept his rheumatism and wore an iron ring on the little finger of his left hand to ward it off, but it would not ward. He kept limping around getting subscribers in blocks of ten or a hundred till pretty soon, during a breathing spell, a company was formed in his home town and the name of the magazine, now grown oppulent, was changed to *The Western Telephone Journal*, and a nice brick building covering a city block was built to take care of the printing of it and housing the office force. *The Western Telephone Journal* became a real factor in the game, and its job printing business was coming from far and near.

Everything in the plant is modern. There are linotype machines, cylinder presses and job presses, cutters, stitchers, perforators, punches, crushers and every tool to facilitate the handling of big and little work. Every machine is driven by individual electric motor. There is an abundance of daylight by day and electric light by night. The type equipment is ample, but traditional with a country town, very little of the good stuff was ever used in printing the *Western Telephone Journal*. You were never able to judge how

good Traer could print by looking at his magazine. That was a "filler" job. It got the worst of it, instead of the best. Like a cobbler's children who go barefoot!

About a year ago, Lichty sold his holdings in the telephone company and retired from the printing house he had helped to build. He gave up the editing of *The Western Telephone Journal* and acted like a retired banker. He also gave up his limp. Today he is selling Florida in blocks to suit.

Editors of telephone journals are rare. The getting of a new one to go out to Vinton, Iowa, presented a problem that was never solved. Mr. Traer had his hands full with a printing business that was the envy of his community and he depended upon the help of his good friends in the telephone field to help him with his magazine. It dragged heavily in his hands. In the edition of last month he tells you in detail why he sold the publication and what he plans to do in the future. In this issue, and in subsequent numbers of Telephone Engineer you will hear from the Western Telephone Journal Company, which becomes a customer instead of a competitor.

There are other telephone men who know why Telephone Engineer was started. They have followed our work with keen relish—the two classes of them, for there were two kinds—one believing we would fail and the other sure we would succeed. For the great number of new readers who come to us by virtue of this consolidation, we reaffirm that Telephone Engineer will aim to treat fairly the whole wide domain of the telephone business, serving the art along the lines of the best engineering, construction and operating practice. We shall continue to advocate competition in both the manufacturing and operating departments of the business. This magazine is a common carrier catering to a distinctively class field. Its columns are wide open to those who have ideas that will encourage progress. It is not under the jurisdiction of the Inter-State Commerce Commission, nor is there any outside force which dominates its expression. There have been rumbles and rumors that we were a subsidized organ of a powerful industrial agency, but it is such a weak, flabby-sided canard that we disregard it. The stock of this concern is of record and there are no dummies. As publishers, we are endeavoring by hard and careful work to establish ourselves in a business with which we are familiar, hoping to grow in grace with telephone men all over the world.

TELEPHONE EXCHANGE DIRECTORIES.

THAT interesting publication, *Advertising and Selling*, contains an article in its August number entitled, "The Most Useful Book in the World." No telephone man need ask what that book is. The article was written by Mr. H. K. McCann, advertising manager for the New York Telephone Company.

Mr. McCann relates interestingly the work of compiling the telephone directory for our biggest city. The figures are astounding, even to those who imagine they appreciate the meaning of large numbers. For example, one hundred and fifty carloads of paper are used in a year. About three hundred men and twenty trucks are used in a single directory delivery; and as three issues are published each year, the delivery of the new and the collection of the old books involves moving something like 3,000 tons of paper annually. In the telephone company's own directory compiling department twenty-six clerks are constantly employed.

But these figures are mentioned here only to indicate the importance of the telephone directory. If the directory of the New York Telephone Company is indeed the most useful book in the world, it is so because New York is, telephonically at least, the biggest city in the world. Each in its own community, the directory of the largest or the smallest telephone company, independent or Bell, has just as much claim to the title.

The work of compiling and publishing telephone directories is often carelessly done, especially in small centers. Mr. McCann says:

> Telephone directory work naturally falls into three classes:
> 1. The making of a telephone directory plan.
> 2. The production and distribution work.
> 3. The selling of advertising space.
>
> Making a telephone directory plan is a vitally important part of telephone directory work. The telephone directory is the great traffic feeder. It is the telephone public's calling list. It is the chart by which in Manhattan alone more than one and a half million people steer their telephone course each day.
>
> In making a telephone directory plan, careful consideration must be given to the following factors:
>
> First: General consideration of the telephone directory's influence on telephone traffic. It can readily be seen that this factor is of paramount importance and involves a careful study of the volume, source of origin, and points of destination of the city's telephone traffic in order that telephone subscribers may have at hand proper directory information. Traffic conditions also govern the number of issues of the directory which are published in any one year.
>
> Second: The general convenience of the book, which necessitates a knowledge of compilation, typographical and printing methods, in order that the size, arrangement, etc., of the directory may be convenient for use.
>
> Third: Production cost, which necessitates a knowledge of printing prices and modern printing practices.
>
> Fourth: The sale of advertising space, which means a study of the directory proposition, with a view to providing sufficient advertising space so that a fairly reasonably revenue may be derived from same, so that advertisers may get definite results from their advertising, and at the same time not have the advertisements interfere in any way with the convenient use of the book for telephone purposes.
>
> Fifth: Distribution methods which involves a study in order to determine the best and quickest method of placing telephone directories in subscribers' hands after they have once been printed, and at the same time getting back old directories, in order that subscribers may have only up-to-date information at hand.

Of course some of these problems apply only to large cities; and most telephone companies in large cities have their own ideas and methods of work, and do not need suggestions for improvement. But many of the rules for making up the New York directory will apply with equal force to the smallest of telephone directories, and could be adopted to advantage. It is not to be expected that the manager of a country exchange would be familiar with the printing business and the publishing business, besides being expert at his own work.

We believe the publication of a poorly edited and unattractive telephone directory does not necessarily indicate carelessness or indifference on the part of the exchange manager. It is more apt to show that he is at the mercy of inefficient or negligent printers. Therefore we believe readers of Telephone Engineer will find useful our new department, Telephone Exchange Directories. The broad experience of the editors of the new department, Messrs. Will M. Traer and J. E.

Magly, in compiling, editing, publishing and printing directories, insures that their work will be of value.

Operators who have any doubt about their directories, or who have any questions to ask, are invited to send us a copy of the book for criticism or comment.

THE CORRECTION OF INCIVILITY.

THE incivility of telephone users, one to another, forms a problem which has been referred to repeatedly in these pages. The difficulty resides in the seemingly ungovernable character of the users, in the sense that they are not amenable to outside direction in their habits and customs. It is beginning to be recognized, however, as the situation is studied, that a great deal of responsibility for condition rests upon the habitual use of certain improper forms and methods of address in opening telephone conversations. These forms, born of a sort of embarrassment and doubt which seem still to accompany the use of the telephone, react upon the user in a manner well calculated to destroy his equilibrium for the moment.

The occasional user of the telephone decides, for example, to call a friend. Even supposing that the operator responds promptly—which she usually does; that he makes no mistake in giving her the number, and that the called party loses no time in answering his call; he is instantly thrown into mental confusion by a "Hello!" or a "Well?" which impinges on his ear with a demand for immediate reply.

Now the telephone Hellos and Wells mean absolutely nothing. The called party would display just as reasonable a spirit should be whistle, or sneeze, or yodel into his transmitter to indicate his presence. "Hello" is merely a noise; it does not start a conversation.

Probably the caller does not recognize the voice. He is startled by the possibility that he may have the wrong number. In doubt, he exclaims, "Who is this?" This is not a very auspicious opening. His auditor may resent the demand, and at best probably replies cautiously. By the time the caller has in turn revealed who he is and what he wants relations are apt to be somewhat strained.

A similar ignorance of proper forms is largely accountable for the common interchange of discourtesies when a wrong number is obtained or a third party inadvertently enters the circuit, as well as for the attacks upon the operator which follow a seeming error or delay on her part. It may be said that impoliteness is generally caused by ignorance; and we have proof that a person may be cognizant of the general usages of courtesy and yet be ignorant of its telephone usages. A telephone conversation is not the same as a conversation *vis-a-vis*, though it may sound the same; and it is a psychological error to assume that "a gentleman face to face is a gentleman over the telephone." He is not, until he has acquired the education which makes him one.

This fact, when one looks at it squarely, is really more encouraging than otherwise. The straightening out of a peculiar kink in human nature might be a hopeless task; education is a mere matter of persistance and patience.

The problem is greater in big cities, like most other problems. So it is in the big cities that serious steps are being taken to educate the telephone users to use the proper forms of speech. As stated before, the solution is purely practical—almost mechanical. There is little of the psychological or metaphysical about it. Induce the people to use certain phrases on certain occasions, and the trouble is practically over.

It can be done. In fact it is being done. It is the big user of telephone service, whose calls per day mount into the hundreds, who is most amenable to suggestion, because courtesy is one of his business assets. The little fellow with the residence party-line telephone can be left to himself. His telephone is classed as a feeder to the big business telephone; and that means that the two connect frequently. Thus the big fellow, his lesson learned as a matter of policy, instructs the little fellow unconsciously in the art of using the telephone. In time the constant example will strike home, and there will be no problem.

In Chicago, elimination of needless conversation is being urged by the telephone company in a letter addressed to "private exchange operators," who are asked to leave out the customary "hello" and give their first name as soon as they answer a call. Superintendent of Traffic Foster, of the telephone company, told of the necessity of time-saving. "We are trying to get the private exchange operators to co-operate with us in this time-saving scheme," he said. "There are 1,275 of these private exchanges in operation in the downtown district, and in a recent test 737 answered with the firm name. 'Hello,' 'yes,' 'well' and other meaningless replies were made by 494 and 44 answered with the telephone number."

When the telephone company is through, all of the private exchange operators will answer with their firm's name. There are enough of them to start the ball rolling, and other business houses will emulate them. That is a long step in the right direction, though it still remains to induce the calling party to reveal his identity spontaneously. That is more difficult because most of the calls of those who know how are incoming, and the little fellow lacks the influence of example. But in time the employees of those houses which have rules for telephoning will spread the practice.

Some of the steps which have been taken in Chicago are told on another page by Mr. H. N. Foster, traffic superintendent for the Chicago Telephone Company. The company has spent much money in this campaign for the use of proper forms. Some of the advertisements it has used in the pursuit are beautiful examples of publicity.

The appeal of the telephone company to the private exchange operator was followed up by the Chicago *Daily News* with a test of its own. The newspaper's investigations showed that only thirty-five per cent of the downtown private exchange operators still cling to the old method of answering calls. Some of the resulting conversational efforts look quite ridiculous in cold print, as for example:

Franklin 764.

Private Exchange Operator—"Hello!"

Reporter—"Hello? Who is this?"

P. E. O.—"Oh, hello, Harry! How did you get home last night? You thought it would rain, but it didn't, did it?"

R.—"Oh, but you must be mistaken. I'm not Harry at all."

P. E. O.—"Oh, g'wan! Don't you think you can

disguise your voice like that; I know you all right."

R.—"But I'm not Harry."

P. E. O.—"Really now? Gee! I may be mistaken, after all. Aren't you the fellow that I saw out at Riverview last night?"

R.—"Why, no, I'm not. Who is this talking?"

P. E. O. (a burst of laughter as she tells her friend at the switchboard of her mistake)—"Honestly, I thought you were Harry. You have a voice just like Harry's. This is the National City bank. Whom do you want?"

Randolph 1280.

Private Exchange Operator (a man in this case)—"Yes," in a deep basso voice.

Reporter—"Yes; hello!"

P. E. O.—"Well, whom do you want to talk to?"

R.—"I'd like to know who this is."

P. E. O.—"Well, I wish you would hurry up; I haven't got all day."

R.—"Is this Randolph 1280?"

P. E. O.—"Yes; Commonwealth Edison. What department do you want?"

Franklin 522.

Private Exchange Operator—"Hello!"

Reporter—"Hello!"

P. E. O.—"Yes, here I am; what do you want?"

R.—"Who is this speaking?"

P. E. O.—"Who is it? Why, don't you recognize my voice? Don't you think I have a sweet voice?"

R.—"I'd like to find out who this is, if you'll tell me."

P. E. O.—"O, but don't you remember me—the girl with the black hair?"

R.—"Can I find out who is talking? What number is this?"

P. E. O.—"Oh, is that what you want? Well, what you give to know? I sort of like to hear you talk."

R.—"Then you won't tell me who you are?"

P. E. O.—"Well, I guess I will, seeing it's you. This is the Bismarck hotel. Whom do you want?"

Randolph 4606.

Private Exchange Operator—"Hello!"

Reporter—"Hello!"

P. E. O.—"Yes, what is it?"

R.—"But I haven't found out who you are as yet."

P. E. O.—"Say, if you know how many have told me that today you wouldn't try to flirt with me, whoever you are."

R.—"I'm not trying to flirt, operator. I'm merely trying to find out who this is speaking."

P. E. O.—"And if I told you my name you'd want to make a date with me. Well, that won't go, see?"

R.—"I'm afraid you don't understand me at all. I'm not trying to learn your name. You remember you haven't told me whether I've got the number that I called as yet. How do I know who this is?"

P. E. O.—"Oh, I beg your pardon. I thought you were another one of that flirty kind. We run into so many of them in this game. Well, this is the Continental and Commercial bank. Whom do you want?"

Main 4887.

Private Exchange Operator (a man)—"Hello?"

Reporter—"Hello!"

P. E. O.—"Well, what do you want?"

R.—"But who is this speaking?"

P. E. O.—"Never mind who this is. Who is it that you want to talk to?"

R.—"Will you please tell me who this is?"

P. E. O.—"Say, whoever you are, I wish you would 'come to' and say what you want."

R.—"Who did you say you were? I thought that you people were supposed to tell who you were as soon as you answered the call."

P. E. O.—"Well, I can't 'kill' any more time with you. This is the Hotel Sherman Company and if you want any one, why, say so."

However, we fear that in some of these cases the *News* reporter chose a bad time for his calls, when the regular operator was off duty. The Commonwealth Edison Company, for example, is very careful of its employees' telephone conversations, and issues a booklet of instructions to them on the art of telephoning properly.

In spite of the discouragements which come daily, we are already beginning to see the end of telephone incivility. Education and example are already doing their work, and before many more years are past, we may cease to apologize for the telephone boor.

BRITISH TELEPHONES UNDER GOVERNMENT

IN another year the telephone system of Great Britain, even now not remarkably efficient, according to American standards, will take a retrograde step by passing into government ownership. Already the inevitable tendency toward retrenchment on the part of the expiring company is manifest, the expenditure for the development of new business being about half what it was a few months ago; although the company is to be credited with taking good care of some 30,000 new subscribers obtained within the last year, many of whose accounts will begin to show profit only after the great transfer.

Politically, Great Britain, in spite of its monarchic head, is not unlike our own country. Its politicians, if not so prominently stamped with the machine brand, are still politicians—appointed by virtue of their following, not of their suitability. To place a vast technical organization of the delicacy and intricacy of a telephone system in absolute charge of such an individual, however earnest his purpose, is to court, if not disaster, at least appalling inefficiency.

Major O'Meara, of the British postoffice, as related in his paper on another page, has discovered the causes of American telephone efficiency. It is even predicted that with our systems as shining examples, the postoffice may hope to inaugurate improvements that even the National Telephone Company neglected. If it does, it will be a surprise to those who have studied the effects of government ownership of public utilities. Not a shadow has been cast upon the efficiency of the postoffice engineering staff, but unfortunately the engineers are not the dictators under such conditions.

Government ownership of the British telegraph system has been a colossal financial failure. It will take more than an efficient and even brilliant engineering corps to keep the telephone system from following in its footsteps. Let us hope for the good of the service that some beneficent political convulsion will establish a new order of things in Great Britain, or instill some commercial ability into the present organization before the transfer is made.

Telephone Courtesy in Chicago

By H. N. Foster

"HELLO!"

"Hello! What is your number?"

"Hyde Park, 1-2-3-4."

"Ring off, I don't want you."

Occasionally it may be the fault of the operator in giving a wrong number, but often it is due to the calling party's lack of forethought in looking up the proper number in the directory and calling by a somewhat defective memory, or to a transposition of the numbers. Even though the fault be the company's, or the calling party's, how infrequent is an apology for the error.

The same gentleman who calls you by telephone in this manner, would not think of calling personally at your house in the same boorish manner. A ring at the door bell is answered by a maid, who meets with the courteous inquiry, "Is this Mr. Brown's house?" or, "Is Mr. Brown in?" The answer, equally quiet and courteous, "No, Mr. Brown's house is next door," is met with a polite apology and expression of regret at having given unnecessary trouble. The same consideration should be shown over the telephone as is used in personal intercourse.

At times it is even more difficult, where the right number is reached, for the parties to get the conversation started on a rational basis, for example:

"Hello! What is your number?"

"Hyde Park 1-2-3-4."

"Is this Smith, Brown & Co?"

"Yes."

"I want to talk to Mr. Brown."

"This is Mr. Brown."

Much time is lost and tempers ruffled, yet how many of us are conscious that we ourselves are the cause of much of this entirely unnecessary telephone discourtesy and incivility? How many of us answer the telephone with the discourteous, unnecessary, and unmeaning "Hello?" Such an exclamation conveys no intelligence as to who is talking, and causes delays and annoyances to both parties.

It is not for us to say why the lack of civility and courtesy is so common with telephone users, but rather to remedy these unfortunate conditions. Telephony is comparatively a new art, barely over thirty years old. Its progress has been so rapid during the last few years, and its use by all manners of people is so universal that it is perhaps not surprising that many rush in and command its service in a manner least adapted toward procuring the best results.

I am really just a Co-operator
There is the unintelligent machinery in telephony, and there are the human factors – three of them, the person calling, the person called and the operator, who can only co-operate with the other two.
Harmonious action between the three human factors (involving courtesy, promptness, intelligence) operates on effective telephoning as oil reduces friction in machinery. The operator alone is incapable of giving perfect service.
The highest degree of efficiency is reached when the parties calling and called observe the simple rules laid down in the Company's Directory and also use such courtesy as is expected in face-to-face communications.
Chicago Telephone Co.
203 Washington Street
May I suggest the right way to use the telephone?
Much needless irritation would be spared telephone users by attention to a few simple directions. In talking, your mouth should be directly in front of the mouth piece and about one-half inch from it. Talk in your natural tone of voice. Enunciate as clearly as possible. Hold the receiver lightly but firmly to the ear.
In calling, give the name of the exchange first and the number last. Say "Main 294," not "294 Main." Give close attention to telephone numbers. Do not try to remember too many of them. Do not call Main when you want Harrison, or 80 when you want 90. In answering the telephone, say who you are – give your own name or the name of your firm. The word "Hello" is absolutely unnecessary.
If connection has been made, the ringing is done by machinery, not by the operator, and you hear a pulsating sound indicating that fact. If you do not hear this sound or get your party, signal the operator by moving the hook up and down slowly two or three times. If, after finishing your conversation, you wish to be connected with another line, move the hook slowly up and down.
Chicago Telephone Co.
203 Washington Street
Do you know how much the service depends on you?
In the operation of the modern telephone, the part which the subscriber plays, has been greatly simplified. He has no longer to turn cranks and press buttons. The lifting of the receiver from the hook notifies the operator of his desire to talk; the replacing of it tells her that his talk is ended.
But though he is relieved from assisting in operation of the telephone machinery, the subscriber is none the less responsible for the discharge of functions vitally necessary to good service.
Telephone service is reciprocal. The subscribers must help give each other good service by themselves giving it. Attention to the correct methods of telephoning, care in the use of numbers, promptness in answering – these things add much to the efficiency of the service.
Chicago Telephone Co.
203 Washington Street

It has proven such a time-saver that many in their anxiety to save time have forgotten the little phrases and practices which go so far when in personal contact in smoothing over the rough places and making life more pleasant.

There are three features which serve well toward remedying these conditions.

One is the personal practice of the Golden Rule, "Do unto others as you would that others would do unto you." In telephoning, we should treat and speak to every one in the same quiet, courteous manner we would expect from them, not only over the telephone, but in personal intercourse.

Second is the general education of the public, not only in the proper use of telephone apparatus itself,

but in proper telphone courtesy. The familiar advertisement, "The Telephone Way," applies not only to the commercial use of the telephone, but to the proper telephone courtesies as well.

The public does not take kindly to being reprimanded, nor to being called to account for the error in its ways. It does, however, prove most receptive when properly approached and a great deal has been accomplished in Chicago along this line by the use of judicious and carefully worded advertisements.

The campaign of education was taken up by the Chicago Telephone Company only after careful and exhaustive planning. First, a scheme of illustrated advertisements was laid out in a way to attract the public eye and insure their being read. Much care was nesessarily given to the narrative portion of the advertisements. While this wording was constantly changed, the general type of advertisements was continuous, and the public soon became familiar with the calling and called party was shown. Various hints and suggestions were given as to the rights of party line subscribers, and the co-operation and considerate use of these circuits necessary between them. The co-operation of the subscriber with the telephone company was solicited in every way possible.

The letters received from the general public and telephone users referring to these advertisements and their suggestions for further advertisements covering points not as yet brought out, were most gratifying.

The illustrations here are replicas of the types of advertisements used.

Other influences for remedying these conditions are found in the personal work carried on by each employee of the telephone company, not alone during business hours, but in their homes, and the instruction and education of private exchange operators throughout the city.

The Chicago Telephone Company's own private

Are you sure you're calling the right number?
Good telephone service depends vitally upon care in calling numbers. A wrong number called by the subscriber wastes time and obstructs the service. Many such instances mean serious loss to all concerned — a loss almost wholly avoidable
The subscriber may think – wrongly – that he remembers the number. He may – and this is very common – transpose the numbers, calling, for instance, 4535 instead of 4385. He may fail to call distinctly, so that the operator hears 5 for 9, or 8 for 0. The operator may repeat the number wrongly, the subscriber failing to note the error. Finally, the error may be made while the operator passes the number wanted to the junction operator.
Special precautions are taken to guard against mistakes by the operators, and experience proves that a little more care on the part of subscribers would greatly increase the efficiency of the service. Don't trust your memory. Take care not to transpose figures. Speak the number distinctly. See that the operator repeats it to you distinctly.
Chicago Telephone Co.
203 Washington Street
Courtesy promotes efficiency in telephone service
People who are studiously polite in face-to-face intercourse with others, are sometimes blunt and thoughtless when using the telephone. To call a party and fail to be at the telephone when the party answers, is a breach of good manners and a waste of time.
Calling or answering by proxy – an office boy, for instance – causes much waste of valuable time, not merely to the parties responsible, but to subscribers in general, as it tends to block traffic. A minute or two wasted in this way, multiplied in repeated instances, means serious impairment of the efficiency of the service.
Another act of telephone discourtesy is committed when the calling party asks the answering party: "Hello, who are you?" The courteous question should be, "Is this so-and-so." But even this form of question is superfluous, for the answering party should, on taking his receiver from the hook, give his telephone number and name or name of his house.
Chicago Telephone Co.
203 Washington Street
Introduce Yourself
When you are called on the telephone do not wait for the party to speak. Don't say "hello!" Give your number, or your name, or the name of your firm; for example, "Main 294," "Jones & Co.," or "Mr Smith."
If this rule were strictly followed, subscribers would save themselves many annoying and occasionally ridiculous experiences, such as the exchange of questions, "who are you?" etc.
If the wrong number has been called, your immediate introducing of yourself will save time for all concerned – if the right one, the conversation begins without preamble.
Chicago Telephone Co.
203 Washington Street

their form and would look for the different telephone hints as given out through the medium of the daily papers.

Particular attention was called to the proper method, not alone of making telephone calls, but also as applied to answering telephone calls. The part performed by the operator, who is really a co-operator, co-operating with the person calling and the person called, was carefully shown. Attention was called to the time of the calling party answering, and to such points as the right way to answer a telephone, first introducing yourself, instead of waiting for the party to ask who you are, etc.; to the fact that courtesy promotes efficiency in the telephone service; to the necessity of referring properly to the directory and in that way making sure of calling the right number, and to the practice of making a courteous apology when an error is made. The dependence of the telephone service, not alone on the operator, but on both exchange operators are handling hundreds of incoming calls daily, each one answered with the quiet, courteous and identifying phrase, "Telephone Company." The officials and others about the company answer their lines with their names, as, "Mr. Brown," or with the department name, as "Auditor's office," "Traffic department," etc. This same idea is carried out generally by our people in their homes. Private exchange instructors are making hundreds of visits monthly among large telephone users, and not only encourage the proper answering of the switchboards with the name of the firm, as "Mandel Brothers," etc., but these visits are followed up with personal letters to the store heads, enclosing a copy of instructions left for the p. x. operators, and asking the encouragement and co-operation of their people in following it out.

This campaign of education and suggestion reaches not only one, but thousands, and gradually the public is becoming familiar with this and oftentimes

unconsciously adopts the same methods. Store managers are encouraged in having sets of rules for their employees, applied to the proper way of using the telephone in taking orders, etc., and throughout these instructions, the entire key note is courtesy to the calling party and treatment the same as though it were a personal interview. One of the largest stores in this country has placed before the telephones throughout the store and in other ways circulated the following among its employees.

"The manner in which a person uses a telephone indicates his character to a great extent, and makes either a good or bad impression. And this impression is reflected directly upon the establishment from which such message comes.

"It is a pleasure to do business with a house which performs every detail in a clean-cut, satisfactory manner, but it leaves a sting to be answered abruptly or discourteously over the telephone. It is folly to lose one's temper because one does not get immediate connection. This is rarely ever the fault of the telephone operators, who are nearly always courteous and prompt.

"When one is called to the telephone, he should respond quickly, and the person calling should not be left to hold the wire too long—something decidedly irritating and often unnecessary.

"Let us, throughout the whole house, strive to excel in satisfactory telephoning."—From a printed card Marshall Field & Company have placed on their telephones.

Evidence that large employees, railroads, manufacturers, wholesalers and retail firms are awakening to the value of telephone etiquette and enforcing courteous telephone practice among their employees is daily coming to hand.

Another influence is in the telephone companies' own instructions and practice. Phrases are modeled carefully to give the greatest amount of information in the fewest possible words, and at the same time their construction is such as to promote their courteous expression. The general use of the rising inflection has a great influence on the practice of subscribers in their use of the telephone.

"The world was not made in a minute," nor can the art of courteous telephone treatment be brought to universal practice at once. In constantly striving toward this end, by example, and by systematic methods of influence and instruction, much has been accomplished and much more can be done.

Salesman or Solicitor?

By George L. Willman

WEBSTER'S DICTIONARY gives the following synonyms of the verb, solicit: "To beseech; ask; request; crave; supplicate; entreat; beg; implore; importune." Some solicitors do all this and more to get orders. The prospect is sure of it—especially the importunity. It seems too bad that a man should have to go to all this trouble to get rid of such a good thing as a telephone—if anything ought to speak for itself it should be the telephone. Then there must be something wrong with the prospect or with the solicitor. Obviously the telephone company hasn't much to do with the character of its prospects—beyond establishing a reputation for good service and fair treatment.

However, the telephone company has very much to do with the character of its solicitors. To make a flying start, we shall assert that the solicitor is all a mistake and ought to be fired on the spot. Does any well-managed, well-operated company, giving good service and treating the people right, need men to go around and beseech, crave, supplicate, entreat, beg, implore and importune the people to take its service? Yet that is exactly what the common or garden variety of solicitor does. From the nature of his tactics and methods there isn't a more apt description of his work than the word solicit, or a more exact name for his office than the very word solicitor. Supposing you should start out tomorrow morning to look for a job (the word is used advisedly) getting subscribers for a telephone company, what would the first manager ask you? In nine cases out of ten, "Ever have any experience canvassing?" That's it—*canvassing!* Many telephone companies are hiring canvassers, men who have had experience selling books, coat-hangers or patent floor mops! Telephone service is sold by importunity—or, to quote Webster again, by "pressing and pertinacious solicitation."

The writer does not overlook the fact that there may be many cases where just such men are the kind of men to hire—and the more importunate they are the better—but the contention is that such cases are the exception rather than the rule. Where telephone conditions are healthily normal you do not have to implore or importune the people to take your service; but even then you do need some one to present its advantages in direct application to the personal circumstances of the individual. If this is done in a clear, courteous and self-respecting manner it will not have to be attended with prayer to insure its favorable reception. When a subscriber takes your service because you implore him to do so, he is an almsgiver, you are a beggar. When he takes it because you importune him to do so, he is a victim; you are a hold-up man. But when he takes it because you have shown him the value of its advantages, he is a satisfied customer; you are an honest salesman. Then as a business proposition, whom do you want to hire as your business representatives—beggars, robbers or salesmen?

But if solicitors can get the business, you ask, why won't they do? The answer is, they do not get the business. There are always a certain number of people who have seriously considered taking telephone service, they have been convinced of its merits ever since Aunt Sue had her telephone put in, they are just waiting for enough sand to make a break. The solicitor gets them. Others have made up their mind and they have the sand, they are just waiting for a favor-

able opportunity to go down to the office and make application. The solicitor gets them. Brown is going to open a store next month, or start a milk route from his house next week. The solicitor gets the tip from a friend, rushes out at an expense to the company of half a day's time and heads Brown off before Brown gets down to the office to sign the application. The solicitor gets him—and puts one over on the manager. Is this really getting the business? Analyze the contracts turned in by the average solicitor, see what percentage represent business worked up from the very beginning and really closed on the actual merits of the man's selling ability. That will tell the story. The solicitor may hasten the decision of the wavering or bring in a little earlier the orders of those already decided, but this describes the limit of his real value to the company. As before stated, there may be cases where the solicitor is the man for the job, but the job will always be the mere collection of orders—it will represent just about as much intellectual qualification as that necessary to drive a laundry wagon and pick up the Monday morning's wash!

There are so many people who have almost or quite made up their minds to take telephone service that even the rawest kind of a solicitor, if he is a far and a fast walker, can go out and make a pretty good showing. This is why so many good, smart managers are satisfied to hire broken-down book agents. We see such managers priding themselves on the amount of business their force of solicitors is bringing in—and, at the same time, absolutely disregarding the significance of the fact that fully as much business is coming in over the office counter. When people come into your office and buy as much service as your good-sized force of solicitors can head off, it shows, first, that orders are not difficult to secure, and, second, that your good-sized force is not walking either very far or very fast. The growth of the telephone business is one of the commercial wonders of the world, but as much as he would like to, the writer cannot conscientiously ascribe the credit to the sales departments of the telephone companies; it is due to the indispensable convenience of the telephone and to the noteworthy efforts of the inventors and the engineers who have rendered the present perfection of the service a possibility.

Then why should we need salesmen, you ask. There are circumstances under which well enough should not be let alone. At this point we shall attempt to differentiate more clearly between the two abstractions—solicitor and salesman. The former is a generic term used to describe the employee who is hired for the qualifications of gall, good clothes, canvassing experience and a willingness to work for $15 a week. His future, like his education, he has long ago left to chance. Like the manager who hires him, we shall consider his ethics a matter personal to himself and not to be discussed. He is hired generally by the week and sent out early the next morning with a rate sheet and a few words of advice to canvass Elm street both sides. Sometimes he is lucky enough to get a post-graduate course by going out for a day or two with a man who has had six weeks' experience. Then it depends upon how many "prospects" he finds. A prospect is a person who has made up his mind to take a telephone, not yet, but soon. Most of them hesitate to sign a paper for the solicitor. The solicitor's tasks are thus: First, he must find the prospects; second, he must convince them that he isn't crooked. For these purposes, it can be readily seen, he requires very little telephone knowledge. And indeed, what he knows, what he is expected to know, and what he is given an opportunity to know about the telephone business is appalling! In his work he finds it much more valuable to know a good friend who can give him "tips."

On the other hand, salesman is a specific term used to describe the employee who is hired for the qualifications of energy, intelligence and character. He is an investment from which returns are expected in the future. He is trained from the rudiments up with this idea in view. Like the solicitor, he begins on Elm street, both sides. The first day he starts he is as good as the solicitor. His record, too, at the beginning, will depend upon how many prospects he finds; but unlike the solicitor, he won't have to convince the people that he isn't crooked. Possibly he will lack canvassing experience; for the chances are he will be a big, business-green, lately grown boy, fresh from college or high school. Yet the only real value that experience in canvassing represents is a hardening of the legs and a toughening of the gall. A good, young, active set of muscles, unabused by dissipation, soon harden to service; a clear, determined eye, a courteous, well-bred manner are things much better than importunate gall.

Because he has an unsoured confidence in the future, the young gate-slammer is willing to learn the great and interesting telephone game; but it takes more than one "canvass" to make a salesman. Knowing this, the far-sighted manager does not hire the applicant with the idea that his tenure shall be coincident with the duration of a single canvass. There are no mushroom salesmen that pop up in a hort time, there are no Topsy salesmen that just grow. Like poets, they are born; unlike poets, they must be made, too. The far-sighted manager watches the novitiate for something more than contracts and with an interest deeper than that inspired by the figures of this month's net gain over that of last. While he watches he trains and coaches his charge with the same care and keen study that the expert trainer uses in preparing the athlete for the championship contest. Under proper tutelage the gate-slammer slowly develops in the difficult art of salesmanship. By and by he begins to realize that modern telephones do not work wireless, that signed contracts do not represent a net profit to the company of the first year's rental and that even an honest subscriber is a creature of circumstance and is a risk to the company. As he grows in the fundamentals of salesmanship the salesman gradually becomes impressed with the greatest truth of all—knowledge is power. Drilled in the ethics of salesmanship he will not yield to the temptation of drawing upon his imagination for talking points and argument ammunition. Every day incidents occur that teach him the great value of knowledge. It is bitter to admit that you do not know, but the real salesman will swallow the bitter pill rather than lie. He has pride and purpose enough in his work never to be caught unprepared on that point again. In the very duties of the conscientious salesman the incentive to learn the business is born of necessity. In training and material, salesmen are the men best fitted to fill the executive positions later on. Another important business axiom which is impressed upon the mind of

the salesman is that business is not business unless it represents profit. The wise manager takes enough confidence in him to teach him methods and costs of production as well as selling price. When the profit standard is put up to a man as the criterion of success it will not be number of contracts but kind of contracts that engages his attention and directs his energies. Realizing the wide divergence between gross revenue and net profit he does not pride himself in terms of revenue. Properly trained, a salesman is impressed with his obligation to the future of his company; he feels a responsibility much deeper than that of the mere order-taker; he has been brought to a realization that the manager depends upon him to a definite extent for the development of the business. Knowing that no real future success, either for his company or for himself, can be built up on the foundation of fraud or misrepresentation he can be depended upon to bring in clean and honest business unequivocally sold. He will not bring in poor and unprofitable orders merely to improve the superficial appearance of his monthly report. Such a man is conscientious in the way he handles prospective subscribers; instead of merely taking orders from those who "come easy," he will exhaust every honest and reasonable effort within the bounds of tact and courtesy to make a sale —rather than cross the prospect's name off his book. His work will be thorough—not the kind that hits just the high spots. His interest and responsibility in the future of the company will make him very careful to treat the people in a way to win good-will and friendship. The public approval of today is the profit of tomorrow—and a book ought to be written on that.

Mr. Manager, why not hire your contract men with the idea of securing salesmen, not solicitors? Care in selecting material and great care in moulding it into form produces the finished article of expert salesmanship. It doesn't cost a cent more to start; and the farther on you get the less it costs, for it means less men and very much more *real* business. Again, let us repeat—there is a difference between order-taking and salesmanship: it is the difference between manual labor and brain work. The work of the trained telephone salesman begins where the work of the solicitor ends; the latter goes down Elm street and reports "nothing doing," the former goes down Elm street and gets contracts. The salesman gets as many contracts in half a town as the solicitor gets in the whole town and does it in the same time. The solicitor solicits, but the salesman sells.

And the day is coming, and fast, too, when you will need salesmen—you will have to have them. That day will be when you approximate the limits of saturation—when everybody has telephones. This may seem paradoxical, but it isn't; when everybody has telephones it is just the time to show real selling ability by getting them to take more or better telephone service. While we are now passing through the period of most rapid development, when even solicitors can obtain apparently gratifying results, it is the very time to pick out and train men capable of selling telephone service profitably when the limit of saturation is approximately reached. It requires a broad knowledge of the telephone business as well as a fine selling ability to point out to a subscriber paying improvements in his equipment and to bring him to the signing moment. This very day the chances are that you have need for salesmen expert enough to sell your subscribers additional equipment. Both from a traffic and a financial standpoint splendid results can be obtained by getting the subscriber to subscribe for enough and the right kind of service to meet the requirements of his business. While the commercial world progresses the subscriber's requirements will be growing with the times, so the need for the expert salesman will always be present.

Then why would it not be wise for telephone executives to hire and train contract men with the idea of permanency in view rather than to hire gangs of order-takers temporarily year after year? Would it not mean economy, efficiency and effective organization to build up an expert force, permanent in its tenure and constant and cumulative in its efforts to achieve a steady, profitable and progressive development?

Tests on Anglo-French Cables

The results of comparative talking tests, recently made by Messrs. W. R. Cooper, W. Duddell, W. Judd and J. E. Kingsbury, upon the new and the old telephone cables laid between Dover and Calais, were very satisfactory and the engineering department of the British post-office has been congratulated upon the successful completion of its undertaking as well as the manufacturers of the cable, who also laid the same, for their achievement in this new and rather difficult feature of submarine work. The tests were made from the cable huts on Abbot's Cliff, Dover, as the landlines for the new cable were not yet completed. The two circuits which the cable contains were connected on the French side, thus making one circuit and the terminals connected with telephones located in separate buildings at Dover. Artificial cables were included at either end of the line which allowed the introduction of what would be equivalent to one to sixty miles of test cable, as desired. Tests were first made by each over the cable alone, after which successive units of the artificial cable were added to the circuit until the limit of commercial conversation was reached. The range of variation was found to be from twenty to twenty-four miles of test cable at each end and the average twenty-one miles at each end. Similar tests were made over the old cable, the range in this case being from twelve to thirteen miles, while the average was twelve and one-half miles at each end. The artificial cables used were equivalent to a dry-core cable, the wires of which have a loop resistance of eighty-eight ohms per mile, and an average mutual electrostatic capacity of 0.054 microfarad per mile between wire and wire of each pair. The cable is twenty knots long. The coils have one knot spacing, the first being one-half mile from shore. Major O'Meara was the engineer-in-chief.

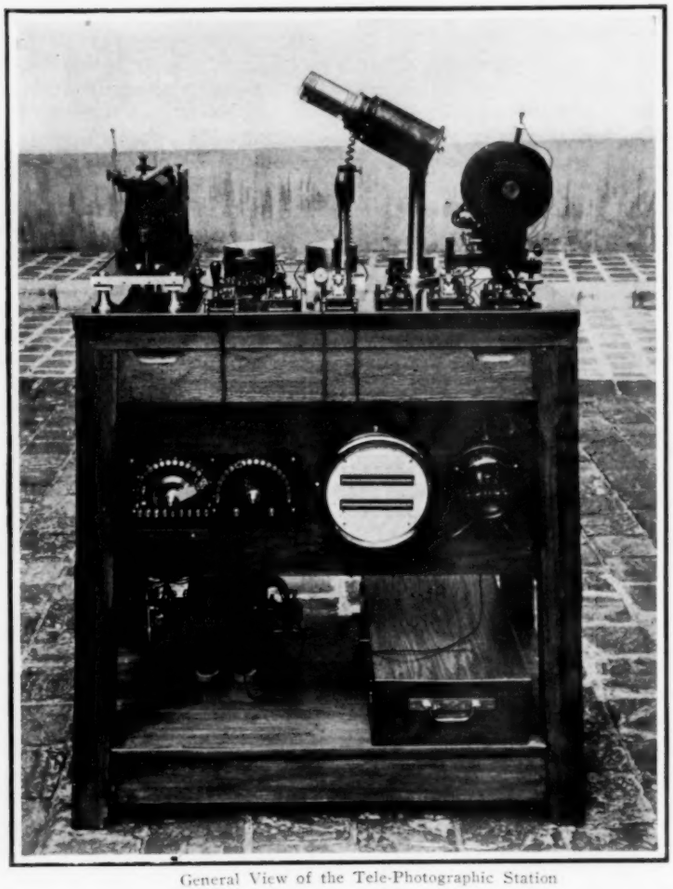
Omaha Receiver Issues Monthly Organ

Lysle S. Abbott, receiver for the Independent Telephone company of Omaha, Neb., issues a monthly magazine which he calls "The Automatic," and which is as lively an organ for an independent operating company as we have yet seen. Lawyer Abbott evidently is a marvel of versatility; for he has already proven his ability as a telephone manager, and now displays strong inclinations that he should have been a journalist.

Improvements in Picture Telegraphy

By Dr. Alfred Gradenwitz*

FEW problems of recent years have assumed the same degree of popularity as the telegraphic transmission of pictures and handwriting. Among the inventors concerned with the solution of this problem there are many who only consider it as a preparatory stage in the fulfillment of a task far more difficult, though incomparably more interesting, viz., the problem of electrical television, that is, a process enabling any kind of objects or animated scenes to be made visible at the other end of a telegraph or telephone line, which in spite of its undoubted attractiveness, possesses very limited practical possibilities. Tele-photography proper, however, is likely to prove of extraordinary value, especially for the purposes of the illustrated press. As soon as a faithful picture of an event, in addition to the news itself, is transmitted to any distance without any loss of time worth speaking of, photographs will assume the same degree of actuality as the reports of newspaper men. The tele-photographic process invented by Professor Korn seems to be quite suitable for such purposes. In fact, his apparatus has already been used occasionally for the telegraphic transmission of pictures.



General View of the Tele-Photographic Station

It will be remembered that a French inventor, Mr. Edouard Belin, of Paris, some time ago designed a new tele-photographic process. This has recently been brought to such a degree of perfection by the surprising sharpness and effectiveness of its reproduction as to excel anything so far done in the same line.

Already, in the first experimental apparatus, as well as in the second outfit constructed for use in transmission between Paris and Lyons, the vital organ of the Korn apparatus and the scheme of most other inventors, viz., the selenium cell, had been replaced by a variable rheostat arrangement.

A photographic print in bichromated gelatine, presenting a series of marked elevations and depressions (corresponding to the shades of the picture), was wound round a cylinder rotating in front of a tracing point carried by the short arm of a lever. The long arm of the lever carried a little wheel rolling upon a series of silver plates alternating with minute sheets of mica of an aggregate thickness of only 1/10 of an inch. By sliding on the elevations and depressions of the picture the double arm lever, with the wheel affixed to its end, thus inserted into the circuit a variable resistance depending upon the depth, and accordingly the shades of the various portions of the picture. The fluctuations in current intensity thus introduced into the circuit were transmitted over the telegraph or telephone line, in order to be reconverted at the receiving station into fluctuations of luminous intensity.

In spite of its relative accuracy and the richness of details obtained with a rheostat of sufficient gradation, there still remained a certain hardness of shades in the reproductions obtained at the receiving station, because of the step-wise alteration in resistance on which the process was based. The inventor, therefore, replaces in his new apparatus, the gradated rheostat by a microphone of special construction, which not only excludes any abrupt variation and corresponding harshness of shades, but on account of its sensitiveness, is actuated even by the minute differences in relief present in any ordinary photographic print, so that there is no necessity of preparing any special photograph. The apparatus installed at the sending station outwardly resembles a phonograph. The picture to be transmitted is wound upon a rotating cylinder which, like a phonograph roller, at the same time performs a progressive motion in the direction of its axis. The microphone above referred to is substituted for the phonograph membrane, converts those slight elevations and depressions in the photographic print (corresponding to the shades of the picture) into fluctuations of current intensity, which, like telephone currents, are transmitted over a line of electrical conductors, to the receiving station situated at any distance, in order there to be reconverted by a sensitive galvanometer (oscillograph) into fluctuations of luminous intensity. In fact, this galvanometer carries a mirror which, according to the intensity of the current flowing through it, undergoes a variable deflection, thus controlling, in

*Scientific American.

conjunction with a scale of graded shades, the intensity of light acting upon the photographic film or paper. This is how, with an extraordinary sharpness, are reproduced in succession, all the various points of the picture, even the slightest shades being fully rendered without any abrupt transition.

The most interesting part of the apparatus, viz., the microphone, which also lends itself for use in long-distance telephone communication, is constructed as follows:

To a flat cylindrical box is fixed an insulated carbon bottom *F*, and to this is attached another insulating plate *G* perforated with holes 2 millimeters (0.0787 inch) in diameter, that are arranged at equal distances apart, on three concentric circles. Into each of the holes is tightly fitted a carefully shaped spherical carbon grain, and against these grains is applied a carbon membrane *M*, 90 millimeters (3.54 inches) in diameter, and 7 hundredths of a millimeter (0.00276 inch) in thickness. This membrane is substantially encased at the edges and communicates directly with the microphone box, to which one of the terminals of the circuit is connected, while the other terminal communicates with the bottom plate *F*.

Portrait Transmitted by Belin Process.

The exact position of the membrane *M* is adjusted by properly tightening some paper rings on which it is resting. The system constituted by the bottom plate, the grains and the membrane, thus is conductive, and if the resistance of the contacts were *nil*, would short-circuit the two terminals. However, each grain obviously forms a shunting of the circuit, the internal resistance of the microphone being lower as the number of grains is more considerable. In actual practice Belin has found three grains to be quite sufficient, provided these grains be located at the three summits of an equilateral triangle, but the sensitiveness of the system could obviously be increased or diminished at will by altering the number of grains and distributing them either over the three circles, or any one of them.

For the sake of its application to tele-photography, the microphone is so adjusted that the membrane will tighten the grains sufficiently to prevent any motion between them and the bottom plate. As soon, however, as any pressure is brought to bear upon the center, the flexibility of the membrane between the three summits of the trinagle will enable it to give way without breaking.

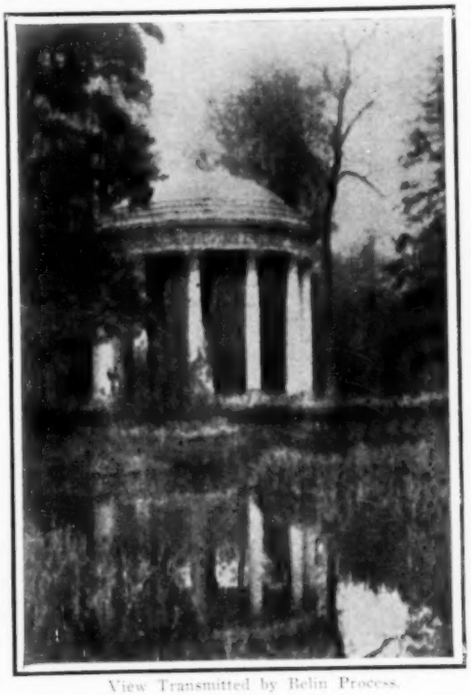
The contacts between the grains and the membrane on the one hand, and the grains and the bottom plate on the other, are the more perfect, as the pressure exerted on the membrane is more considerable, and their resistance, as well as the total resistance of the microphone, will be reduced in proportion.

Experience has shown this apparatus to resume with absolute safety its initial resistance as soon as the pressure is relieved; a given pressure always corresponds to a given variation in the resistance of the microphone. This can be ascertained by means of a micrometrical outfit similar to a spherometer, provided the external conditions be left unaltered.

The only difficulty to be overcome was that the microphone being in itself of very low resistance any variations in its persistence are quite negligible as compared with the absolute resistance of the circuit. In telephone work this difficulty is avoided by using an induction coil, but such an apparatus could not be used in connection with tele-photography, lest the dark and light portions of the picture be mixed up.

Belin therefore devised the following arrangement:

The microphone was substituted for the resistance to be measured, in a Wheatstone bridge formed by the transmission line, the galvanometer being replaced by the receiving post. The three remaining branches of the system can be chosen at will, and by a proper regulation, allow the intensity and sensitiveness of the arrangement to be readily controlled. The receiving and transmitting apparatus are maintained in absolute agreement independently of the length of the intervening line.



View Transmitted by Belin Process.

On account of the extraordinary sensitiveness of the microphone, it is not only possible but it is indispensable to resort to extremely slight differences in relief. In fact, the best results are obtained with ordinary photographic carbon paper, the relief of which is perceptible neither to the eye nor to the touch.

The fluctuations in current intensity produced by variations in the microphone resistance (which in turn correspond to the different shades of the original photographs) according to the above, are transmitted to the receiving station situated at any distance, in order there to be reconverted into fluctuations of light and impressed on the record.

The receiving station is identical in principle with the arrangement used in the original apparatus, a Blondel oscillograph being used to produce this conversion.

The oscillograph, as is well known, mainly consists of a strong electro-magnet including between its pole pieces two extremely thin wires. These wires are connected together at one end, and constitute a loop closing the circuit. In their center is arranged a small mirror of about one square millimeter (0.00155 square inch), which by the torsion of the wires, as produced by the passage of the current, is deflected more or less, according to the actual current intensity. On this mirror falls the converging beam from an intense lamp, e. g., a Nernst lamp, the reflected rays being projected on the surface of the film on which the reproduction has to appear. By inserting an aplanatic lens, these rays are always concentrated in a given point, and by arranging a scale of light filters of regularly increasing transparency, the reflected rays are varied in intensity in proportion to the actual current intensity (and accordingly to the shades of the original picture), so that the rendering on the film gives a faithful reproduction of the last. Any diffrac-

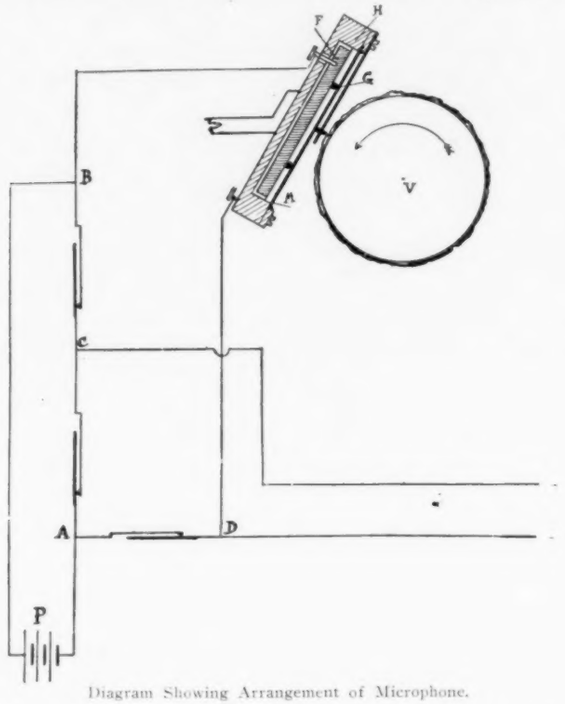


Diagram Showing Arrangement of Microphone.

tion is avoided by arranging an extremely thin opening one-sixth millimeter in diameter (0.0236 inch) above the sensitive surface so as to be in immediate contact with the latter.

As the original photograph can be made ready within fifteen to twenty minutes, and as the time of transmission does not exceed three to four minutes (which is very much shorter than in connection with any other process), it may be said that the Belin process alows any event to be reproduced by a faithful photographic picture, twenty to twenty-five minutes after its occurrence, at a distance of up to 1,500 miles.

The same process obviously, is excellently adapted for the transmission of handwriting and drawings. The reproduction of a photograph as telegraphed by means of this apparatus frequently possesses even more strikingly artistic effects than the original itself, as the minute traces of indistinctness still left, will impart to the picture the very appearance of a painting.

Spokane Interstate Acquires Big Property

President Thaddeus S. Lane of the Interstate Consolidated and Home Telephone Companies of Spokane has announced the acquisition of the big elephone properties in eastern Montana, formerly owned by P. B. Moss, president of the First National bank of Billings.

While the Moss properties were taken over by the State Telephone and Telegraph Company, of which Mr. Lane also is president, it is stated that the deal was consummated with a view to bringing one more system under the control of the Interstate Consolidated Company, the big Spokane holding company.

Besides President Lane, the State Telephone and Telegraph Company was represented in the transaction by Patrick Wall and John F. Davies, of Butte, and A. B. Cook, of Helena, all of whom are directors of the Interstate Consolidated.

The newly acquired independent telephone properties are second in importance and magnitude among the Montana independent companies only to the Montana Independent Telephone Company, and comprise exchanges at Billings, Columbus, Laurel, Bear Creek, Bridger, Joliet, Red Lodge and Fromberg, and long distance lines extending east to Huntley and south to Red Lodge.

While the terms of sale were not made public, it is believed that the price paid for the entire Moss system amounted to nearly $250,000.

The State Telephone and Telegraph Company connects with the long distance lines of the Montana Independent Telephone Company, which system soon will enter Spokane over the lines of the Interstate Telephone Company, limited, of Spokane, the corporation taken over about one month ago by the Lane interests.

Chief Engineer Charles L. Zahm, of the Interstate Consolidated Company, with headquarters in Spokane, has just completed a tour of inspection over the State Telephone and Telegraph system.

Injuction Against Telephone Merger

The Kinloch Long Distance Telephone Company, St. Louis, in the Sangamon County Circuit court at Springfield, Ill., obtained a temporary injunction to restrain the American Telephone and Telegraph Company, the Fayette County Telephone and Telegraph Company, the Central Union Telephone Company, the Vandalia Telephone Company, C. H. Rottger and other officials of the various companies from turning over the stock of the Vandalia company and other companies in the southern part of the state to the Central Union Company.

The Kinloch company alleged that the proposed transfer of this stock constituted an attempt on the part of the American Telephone and Telegraph Company to obtain a monopoly on the long distance telephone business in that part of the state. The complaining company argued that such a monopoly would be detrimental to its interests.

The temporary injunction was allowed, and the transfer will not be permitted until the case can be heard in court.

Chesapeake Bay's Submarine Cable

By Francis O. Marden

FIVE miles of armored submarine cable, containing sixteen pairs of wire, has just been laid by the Bell Telephone Company of Pennsylvania beneath the waters of the Chesapeake Bay. The cable is one of the best ever designed and its preparation occupied the attention of a corps of expert engineers for some little time.

When this cable left the New York plant of the Western Electric Company, consigned to the Bell Telephone Company of Pennsylvania, it was in four sections, each section strung on an immense reel. Each of these sections consisted of 6,600 feet of cable, and each spool with its load weighed 58,000 pounds. Even without its mile and a quarter of cable, each spool weighed two and a half tons.

The cable with its armor was about 2½ inches in daimeter. A lead sheath which served for protection was 5/32 of an inch in thickness. This cover was wrapped with three reverse layers of jute and then armored with lengths of wire about one-quarter of an inch in diameter. Over this were placed two more layers of jute. This outer covering is believed to be capable of withstanding the ravages of the deep for many years.

The cable was taken from its four reels at the dock on West street, New York, and wound in a "figure eight" on board the barge. It proceeded to its destination in Chesapeake Bay without any mishap and the work of installing the cable in its final resting place was begun immediately upon its arrival.

Feeding Out Cable Over Bow of Barge.

Landing East Shore End—Cable House Seen on Shore.

Shipping and laying the cable, because of its great weight and length, was a tremendous undertaking. A start was made from the east shore and the end of one section was buoyed in the bay. The other three lengths, which had already been spliced together into one piece nearly four miles in length, were laid from the west shore. The free end of this section was then spliced to the first quarter at the meeting place in the bay.

The sixteen pairs of wire which this contains will serve telephone subscribers in Delaware and on the eastern shores of Maryland and Virginia with excellent connections through to Baltimore and the rest of Maryland.

This cable makes conversation from Baltimore to Cape Charles and other peninsular points equivalent to a conversation over a land line fifty miles shorter than by way of the route previously used. The Bell Telephone Company of Pennsylvania has run additional wires to the terminals of this cable from points in the southern part of the eastern shore peninsula and from Baltimore and Annapolis to the other end.

The development and designing of this cable occupied the attention of a corps of expert engineers in

Chicago, New York, Philadelphia and Baltimore for two or three months.

The accompanying illustrations are some snapshots of the operations of shipping and laying this cable. The pictures show the manner in which the

View of Four Great Reels—Pulling Cable Aboard the Barge.

work on the shores of the bay was done, with a number of barges placed in position to receive the enormous weight as it was spun out from its position on the larger boat.

Dictating Letters by Telephone

In many busy offices, the phonograph has entirely displaced the stenographer as the intermediary between the dictator and the typewriting machine, says the *Scientific American.* The time of the typist is thus economized, and the dictation may be recorded when and at any rate desired.

A further improvement has recently been developed. The phonograph has been entirely eliminated from the dictator's office. In its stead a desk telephone is used, and the words spoken into the transmitter are conducted to the typist's room, where they are automatically recorded on one of a battery of wax cylinders, ready to be reproduced and transcribed on the typewriter. Each desk in an office may have its own recording cylinder, so that any number of persons can dictate simultaneously. Thus, instead of having separate phonographs, the apparatus is all centralized in a single multiple recorder, which also includes a reproducer used by the typist in transcribing the dictation on the typewriter.

The desk telephone is not furnished with a receiver, as all communication between the dictator and operator regarding the operation of the recorder is carried on by automatic signals. Wherever one wishes to dictate a letter, he picks up the transmitter on his desk and, in doing so, unconsciously grips and depresses a button in the standard of the instrument. This closes the circuit of a magnetic clutch in the recorder cabinet, whereby the drum which carries the wax cylinder operated upon by this particular transmitter is set in motion. The same button closes the circuit of a signal lamp at the top of the telephone standard, and as long as this glows, the dictator is aware that the recorder is operating properly.

The cylinder will take an eight-minute dictation before it needs to be replaced. At any time, if the dictation is interrupted, the cylinder may be stopped by releasing the button on the transmitter. Half a minute before the cylinder is filled, a switch is thrown automatically which extinguishes the signal lamp, giving the dictator warning that he must stop at the end of the next sentence or paragraph. At the same time a buzzer is sounded in the cabinet which notifies the operator that a cylinder must be replaced, and a lamp opposite the cylinder glows and indicates which one needs replacing. As soon as a new cylinder is placed on the drum, and the recorder is ready for further dictation, the fact is signaled to the dictator by the relighting of the lamp on his transmitter. In the meantime, while one or more persons are dictating, the typist may be transcribing the dictation of previously filled cylinders. The reproducing instrument may be controlled by pressing a button with the foot, so that the typist may take the dictation sentence by sentence as desired, and has the instrument under control, while her hands are free for typewriting.

Efforts to record the vibration of a telephone receiver on a wax cylinder have heretofore proved unsuccessful. The main difficulty has been to produce a mechanism which would be sufficiently sensitive, and which at the same time would follow the eccentricities of the wax cylinder. This difficulty has now been overcome very cleverly. The operating mechanism comprises a pair of electro-magnets which act upon an armature mounted on a strap of thin metal, which serves as a diaphragm. Instead of connecting the diaphragm directly with the recording stylus, an arm is hinged immediately below it. Fulcrumed in this arm is a lever which at one end is connected by a link to the diaphragm and at the other end carries the recording stylus. The arm is provided with a weight at its free end which is sufficient to hold the stylus against the cylinder. Any eccentricity of the wax cylinder is taken up by the motion of the arm, which carries the fulcrum of the lever up and down without interrupting the vibrations communicated from the diaphragm to the stylus through the link. The shaft on which the recorder is mounted is hollow, and within it is the screw which feeds the stylus axially along the cylinder. The shaft is slotted to admit a nut which is carried by the recorder. When resetting the recorder, a cam lever is operated which throws this nut out of mesh with the screw, and breaks the circuit of the magnet as well as of the dictator's signal lamp.

The automatic system of signals between the telephone and the cabinet is very complete, and so simple as to be understood by anyone. The business man has at his beck and call a mechanical ear, in which he can dictate his letters without the distraction of adjusting or regulating a machine. The device is ready to receive his words in or out of office hours. It might be so arranged as to permit him to dictate letters from his home. For long dictation an automatic relay may be used to connect the transmitter with a new cylinder as soon as the first is filled. The dictation may thus be continued without interruption, indefinitely. The instrument might also prove of value to a public typist, who could have a number of offices connected with the recorder cabinet. In hotels also arrangements could be made to have the hotel typist take the dictation of the guests, transmitted by telephone from their own rooms.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

S H-H-H-H! — not a whisper! Use your O'Sullivan's; be very still, for you are in the presence of a quiet, little man who objects to noise. And he is busy; oh, very, very busy. He is engaged in a quiet little job, this quiet and quite small man—mere incident in his quiet life—building Chicago!

You thought the building of Chicago was more than one man's job? Mercy no, not when you know the man! Building Chicago has been going on for some time, but it has never been finished. Chicago isn't a fixed thing, but it is being fixed most of the time. A few years ago an effort was made to establish an independent system of telephones in Chicago. Right now the Automatic Electric Company is making a lot of new stuff and the Subway Telephone Construction Company will install a new system to replace that first effort. The Subway Company's chief engineer is the little man who is building Chicago. There isn't any blare of trumpets and no demonstration that he is doing anything. It is still as a starless night, but the work is rushing along. Twenty thousand lines must be working by June 1, 1911. It is a big job; a hurry-up call with no lost motion. And Bernard Charles Groh is the man who must and will deliver the goods.

The Man Who Must and Will Deliver.

Mr. Groh's name is a misnomer. He only grew a little, and like men below medium height, he feels the handicap of stature. He was born at Grosse Ile, Michigan, February 3, 1877. It was a cold month and he was stunted. Then, do you follow, Groh and Grosse? Bum hunch! He didn't grow large, although it was on the cards. But he was growed on a Michigan farm, if you can grasp that, and he has developed famously when you consider the blights and freezes.

At twenty-two he engaged as helper with a construction gang of the Michigan Telephone Company, and he was paid according to his size, viz.: Ninety cents per day. He stuck. The ninety cents was elastic currency, because it was pulled off the back of the baby octopus and Groh made it cover a lot. He simply toughed it out till he reached the engineering department. He was under Boyce with the old Erie when the combination reached its peak. He left the Erie to become superintendent of equipment of the Inter-State Telephone Company at Trenton, N. J., in 1902, and after two weeks, was chosen as chief engineer. Under his guidance, Trenton, Atlantic City and all of south Jersey were developed.

In 1905 the egineering department of the A. T. & T., at Boston, was standardizing construction methods and its big drag-net brought together all the men of merit in this country. Groh went along and his job gave him supervision of the biggest underground construction that had been undertaken in this country. He was field engineer on long-distance conduit work adjacent to New York City.

In 1908 he joined the Central District and Printing Telegraph Company at Pittsburg, with the title of general plant inspector, a position he relinquished to accept his present position.

Mr. Groh thoroughly enjoys beng a "telephone man." He always finds a lot to do in his chosen profession. You will never find any of the grouch in him and he will never tell you anything you want to know. Mum's the word! Who told you? Groh didn't, remember that. He grinds his own grist and grinds it well. He has been on the job early and late, building Chicago. Conclaves and conventions can come and go, but he won't see 'em and they won't see him. If you want to know how much progress he has made ask the Subway folks—they don't know, and Groh won't tell.

Way back there, if you can get way back in thirty-three years, Groh tried to be an artist. He let his hair grow and grew an imperial. He put in several winters in this disguise, but the microbe of telephonitis killed the germ of the melomaniac and that ended his aspiration to wield a brush. So he wiped the paint from his palette upon a pair of overalls and got back into the game.

Groh says he did his rough work in Michigan and Jersey; took his polish in classic Boston, and served his post-graduate under Sergius Paul Grace. His bug for automatic telephony was acquired under protest from his associates, so he came by it naturally and when Groh gets it by his method, you can't take

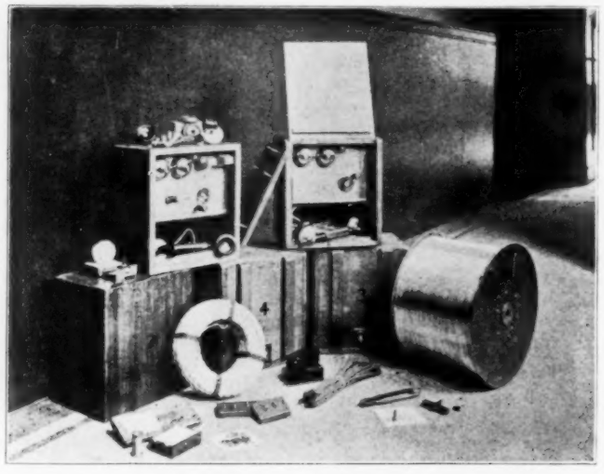
it away from him by yours. You'd be foolish to try.

Mr. Groh is married and has a daughter. He has a hobby, easy to guess, because it is one of those pastimes that harmonizes with the man. Sh-h-h-h—not a whisper! How can you catch a fish when you make a racket?

Telephones for British Antarctic Expedition

In connection with the presentation of a telephone installation in Captain Scott's antarctic expedition, says B. S. Cohen, in the *National Teelphone Journal,* London, an illustration of the apparatus will be interesting. In this photograph will be seen the five instruments in wooden cases. Two of the instruments with hinged lids are designed for fixing in the open on poles, where they will be used in connection with observations of the Aurora Borealis, and will require to stand the rigor of at least two arctic winters. Owing to the extreme dryness, due to the very low temperature, these wooden instruments will, it is thought, stand the exposure better than if placed in the open during a couple of English winters.

The lowest temperature the apparatus will have



Cold Weather Telephone Equipment.

to stand will be about*—70 degrees Fahrenheit, *i.e.*, 102 degrees of frost.

On the right is one of six drums of wire. The latter is bare uninsulated aluminum 19 S.W.G., and on each drum there is about thirteen miles, weighing 100 pounds. The drums are iron, and are of a convenient size to mount on the back of a sledge, from which the wire will be paid out. It will be laid direct on the snow, and, owing to the extreme dryness already referred to, no trouble from leakage is anticipated, although one of the lines will be twenty-six miles long. Metallic circuits will be run, as it will probably be impossible to obtain an earth return. A number of McIntyre sleeves are supplied for jointing purposes. The instruments are Ericsson hand microtelephones with the receiver and transmitter in series, and at the main hut a common battery of 24 volts is inserted in series in the line circuits to provide talking current, as owing to the extreme cold it was not considered possible to fit local batteries at each instrument. The battery is not specially supplied for telephonic purposes, but is used also in connection with the scientific work of the expedition. It is interesting to note that the low temperature will improve the transmission over the aluminum lines by something like 15 per cent, owing to the increased conductivity.

The receivers and transmitters are supplied with wooden earpieces and metal mouthpieces respectively in addition to the ordinary ones, in case the latter, which are ebonite and celluloid, will not stand the low temperature.

An ample supply of spares has been included. The five instruments were built in one week at the head office workshops.

Vail on London Telephones

Theodore N. Vail, president of the American Telephone and Telegraph Company, who was in London for some time en route to New York, had some experience of the London telephone system. He told a reporter that Londoners were to blame for their faulty telphone service because they didn't know how to use the telephone.

"They haven't been educated up to them," he said. "I've seen your people keep a telephone waiting ages before attempting to answer. Again, I've often observed a person answer a call and then put the receiver down and keep the caller waiting several minutes.

"No matter how efficient the central office may be the system must be bad if the public is slack. You people want educating in the art, for art it most certainly is, of using the telephone.

"In New York the people know how to use the telephone because they were born and grew up with it. The telephone is installed in every little tenement in the city and is quite universal. In fact there are more telephones in New York city than in the whole of Europe, startling through it may seem to say so.

"Your system isn't slow; it's the people that are, and they want hurrying along. My advice to English people is, 'Learn how to use the telephone.'"

Connection in Oklahoma

Thirty members of the Oklahoma Telephone Association attended the semi-annual convention held at Oklahoma City in the Lee-Huckins' hotel August 9. Discussion of questions affecting the relation of the association with the public and addresses by prominent officials, were the order of the meeting. Committees were appointed to make studies into the telephone situation of various sections of the state. Reports from these will be given at the next regular meeting in February.

The attitude of the telephone company toward the public, its rights, and its obligations, were the subjects of interesting remarks by Horace Truman of Geary, and L. T. Hine of Purcell.

The dual obligation that confronts the telephone company in its duty toward the community at large and toward the subscriber individually, was discussed by Vice-President R. S. Goffee of Sulphur.

The members of the convention were treated with a visit to a ball game by Assistant General Commercial Superintendent J. W. Wilson of the Pioneer company.

Telephone Exchange Directories

By Will M. Traer and J. E. Magly

A FIRST-CLASS DIRECTORY.

AMONG exchange directories received for review this month, that of the Quincy Home Telephone Company of Quincy, Illinois, is easily in the lead. Directory No. 8, everything considered, is about the best example of a telephone directory that we have as yet had occasion to inspect. Typographically it is near enough to perfection to occasion no unfavorable comment whatever. It is printed on medium-weight machine-finished book paper and has a heavy and durable cover of smooth finish and light yellow in color.

Some very good information is printed under the head, "General Instructions and Long Distance Service." On another page appears the head, "Why the Home Company Deserves Your Patronage," followed by seven logical reasons. Following this, there appears an excellent photograph of the handsome building owned and operated by the Home Telephone Company, with a list of the company officers and directors.

The list of subscribers makes an unusually good showing. In printing this list, a feature that is new to us is shown. In the several alphabetical classifications, in a bold-faced type, there appear the names of different cities and towns with which the company's long-distance service connects, followed by the words, "Call Long Distance." For instance, in the B's we have "Burlington, Iowa, Call Long Distance." It occurs to us that this is a pretty good reminder to the subscriber that his telephone is connected with more than one exchange and it ought to be quite a factor in drumming up toll business.

There is just one fault we have to find with the Quincy directory. On a number of different pages, one-inch display ads have been inserted in the middle of the page. We think this is bad—that the pages would look much better if such ads were at the top or bottom.

In the classified business list that is printed in the back—which, by the way, is very complete—there appears the following notice, that is rather interesting to us, under the head of Express Companies:

"Express Notice.—Any one desiring to send a package by way of either of the two companies, please call Home Telephone No. 10. This telephone belongs to the Home Telephone Company, and is for the use of the public in above cases, because of the refusal of the Express Companies to patronize the Home Telephone Company. By this gratuitous method we are endeavoring to furnish our patrons a way of reaching these common carriers. (We do not deliver express packages, nor have we anything to do with delivery, or what is ordinarily known as express wagons.)"

It seems too bad that the express companies have to deny themselves telephone service.

THE EXCHANGE DIRECTORY COVER.

We have long had it in mind to say something in regard to this important part of the telephone directory. From the many samples we have received in the past, we are of the opinion that very little judgment is exercised in the selection of the cover stock in the first place and about the same amount is given the workout in the finish, the copy, arranging the same and selecting the colors of ink.

It isn't necessary to have a complete history of the company on the front cover and we think it is bad business to have a lot of display advertising as well. The best-appearing cover has the least to say. The line, "Exchange Directory," giving the date if desired, with the name of the company, location of its headquarters, and possibly a list of its exchanges, is sufficient. A reminder to call by number and to destroy previous lists might also be added.

We prefer a cream, light yellow or gray-colored stock. It is better than white, because it doesn't soil as easily and printed matter in almost any color stands out clearly upon it, which is not the case in darker colors. It should always be heavy and tough.

There is some question as to the best method of fastening the cover to the inside sections of the directory. If the cover stock is sufficiently strong and it is to be saddle stitched—that is, right through the middle with the book open—a directory should, with ordinary handling, carry its cover at least a year. In cases where the directory receives an unusual lot of rough handling, a very good plan would be to have the book opened in the center and a small strip of binder's cloth, about a half-inch wide, pasted over the stitches from the top to the bottom and have a similar strip pasted on the binding edge outside the cover, then have it saddle stitched again with two or three flat-wire stitches through cover, back, cloth and all. This sort of a cover will stay on forever and would be just the thing for public pay stations, hotels, etc.

It is a good plan to have your directory round-cornered. This often saves the cover from being torn off. It is also a good plan to have the directory strung with a wire loop instead of string. The loop will last as long as the directory.

PREPARING DIRECTORY COPY.

In preparing copy for a directory, a great many of the details are often overlooked. This causes troublesome delays which might otherwise have been avoided.

A bunch of copy is turned over to the printer—a list of town subscribers, rural subscribers and possibly the lists of smaller connecting exchanges, but no instructions as to the order in which they are to be run or in what style. Left to his own judgment the printer will usually do what he thinks best—which may be just the opposite of what should have been.

Copy for the outside and inside title pages is often entirely missing and it is left for the printer to supply the matter, or hold up the job until copy can be secured.

When advertisements are to be run, a dummy should be carefully prepared with all the ads marked in their position and amount of space. All cuts to be used in ads should be furnished along with the copy. Care should be taken that the cuts furnished are not larger than the entire space the ad is to occupy. When-

ever possible, a business heading—letter head, bill head, etc.—should be furnished along with the ad copy, or better yet, have the ad written upon the firm's heading. This will avoid any possibility of misspelling proper names with which the compositor may be unfamiliar in cases when the copy is not legible.

All directory copy—that is, the list of subscribers—should be prepared upon the typewriter whenever possible or written in a perfectly legible hand that there can be no doubt as to an "A" being an "A," not an "O," or an "N" be mistaken for a "U," etc.

A number of other things could be mentioned but will be taken up as they are brought to the writer's attention.

Early Telephone Development

By W. H. Gunston*

OLD records have a historical, if not a practical interest, and something more than an idle curiosity is aroused by a reference to the National Telephone Company's earliest press-cutting book, which covers a period extending from 1882 to 1885. The strangulating restrictions which the postoffice had placed on the development of the telephone were about this time (1884) to some extent removed by the granting of licenses whose scope was not confined to prescribed limited areas, and while some of the newspapers are loud in their praises of what they consider Mr. Fawcett's statesmanlike settlement of the problem, others deplore the creation of a private monopoly. It is strange to read as far back as 1882, when there were only about 5,000 telephones in the whole of England, allusions to the United Telephone Company as a huge monopoly! Many of the cuttings refer to infringements of patents and to the dispute between the United and the Globe Telephone Companies, which was ended by the acquisition of the latter by the former in 1884.

The *Pall Mall Gazette* of December 6, 1883, contains a lively and instructive description of an exchange in those days:

> What, then is a telephone exchange station? We will take East India avenue, in the city, as an average sample. From the lofty roof of one of the houses of that sombre court rises a derrick, a square structure of wrought iron bars 30 or 40 feet high by 8 or 10 feet wide, and looking like the upper portion of a skeleton lighthouse, very rigid and very transparent. This edifice is surmounted by a lightning conductor; you ascend it by a perpendicular ladder, and, pausing on its upper story—for it is divided into two floors—you look round from your airy perch to find that what appear innumerable wires radiate from your transparent cage in every possible direction over the dirty housetops of the city. Most of these wires are bare and unenclosed; others are in cables containing each twenty wires. Each of them is lettered and numbered, and a cupboard on the derrick contains an apparatus for testing them. So much for what is above the roof. Below, in the attic, is a room occupied by eleven young ladies. The 271 wires, which represent the subscribers of the East Indiana avenue exchange with 46 trunk and other direct wires, are guided down from the derrick above into neat mahogany cabinets or cases, in front of which the young ladies are seated. The alert dexterity with which at the signal given by the fall of a small lid about the size of a teaspoon the lady hitches on the applicant to the number to which he desires to talk is pleasant to watch. On the day of our visit there had been in this one office no less than 2,400 calls. Here, indeed, is an ocupation to which no "heavy father" could object; and the result is that a higher class of young women can be obtained for the secluded career of a telephonist as compared with that which follows the more barmaid-like occupation of a telegraph clerk.

One is at a loss to understand why the telegraph clerk's occupation is classad as barmaid-like.

*National Telephone Journal.

Time has brought about some remarkable changes in the relative telephone development of different parts of the world, although, of course, America has always maintained the leading place. According to the *Globe* of November 23, 1882, the number of subscribers in the principal countries then was:

United States	37,187
England	5,000
France	3,600
Italy	2,902
Germany	2,322

Sweden is not mentioned. The figures probably refer to the end of 1881. The *Times* remarks, "It is in America, of course, where the telephone is freer than on this side, that the development is greatest." Thus early were the cause and effect of Europe's backwardness demonstrable.

The *Pall Mall Gazette* in March, 1883, gives the total number of telephone lines in the world, presumably at the end of 1882, as 78,008, of which 41,569 were in the United States, 7,287 in Great Britain, 5,507 in Italy, 4,437 in France, and 3,613 in Germany. The high position of Italy is noticeable; they are second amongst European states in 1880, in 1889 they drop to fifth place, and at the present time they are as low as ninth. When we come to individual towns we find Paris in front of London, and Vienna in front of Berlin. *The Times* gives the following figures of subscribers' lines for October, 1882:

New York	4,060
Chicago	2,726
Paris	2,422
London	1,600
Amsterdam	700
Stockholm	672
Vienna	600
Berlin	581

Cincinnati comes above London, and Boston and San Francisco above Amsterdam. The development of the United Telephone Company's system in London in the early eighties was as follows:

Dec. 31, 1880	89 subscribers
Dec. 31, 1881	1,338 subscribers
Dec. 31, 1882	2,386 subscribers
Dec. 31, 1883	3,195 subscribers

The National Telephone Company which then operated in most of the towns in Great Britain outside of London and Lancashire possessed the following subscribers at the end of 1882 and 1883:

	1882.	1883.
Total system	2,350	3,487
Glasgow	694	742
Edinburgh	231	283
Bradford	223	283
Leeds	159	286

Great Britain maintained its position at the head of Europe until somewhere in the late eighties, when Germany got in front, and has remained there ever since. Its population, of course, is half as large again as that of this country.

In conclusion I give a table showing the vicissitudes in telephone development of seven of the great cities of the world at various intervals from 1882 to the present time. What is most remarkable is the way in which Berlin passes from last position in 1882 to first in 1888, far exceeding the development of New York, a position which it maintained until 1899. New York has now outdistanced all its rivals, and London is well ahead of Berlin.

	1882 Lines	1888 Lines	1898 Stations	1904 Stations	1909 Stations
New York	4,060	6,902	29,283	148,667	361,302
Chicago	2,726	4,694	.....	78,703	207,719
Paris	2,422	5,300	19,351 (lines)	46,933	69,205
London	1,600	6,978	20,561 (lines)	93,598	181,011
Stockholm	672	5,800	25,000 (approx.)	40,476	61,588
Vienna	600	1,600	10,573 (1897)	20,000 (approx.)	41,552
Berlin	581 (stations)	9,199	36,650 (1897)	66,449	112,225

The Law and the Telephone

By E. J. Wenner

RELIANCE UPON CITY ORDINANCE—RULES FOR EMPLOYEES.

IN the case of Olson against the Nebraska Telephone Company, reported in Volume 123 of the *Northwestern Reporter*, at page 422, two propositions of law were laid down.

The plaintiff was a lineman in the employ of the defendant company and while about his business and acting under instructions to fasten a cable to an overhead messenger wire he came into contact with a highly-charged wire and was severely injured. An ordinance of the city prohibits the maintenance of wires carrying electric current for light or power purposes within five feet of a telephone wire and obliges the owners of such wires properly to insulate them and to repair defects at once.

The company had given notice to its employees in which it directed all linemen and other employees of the company whose duties required them to work upon or about the poles that they are especially charged with the duty of inspecting the implements and fixtures with which they work, and must satisfy themselves that they are safe to work with or upon before commencing operations. The notice further states that it does not employ other persons to make inspections, but relies upon its linemen to make inspection for themselves and to know that the poles and wires are safe, and they are also directed to be on the lookout for power wires before commencing their work.

The Supreme Court held that this notice did not relieve the company from the duty it owed its employee to exercise care and to furnish him a reasonably safe place, independent of such poles, cross arms and wires, to work in.

The Supreme Court also held that the lineman was justified in relying upon the city ordinance when he was directed by the foreman to fasten a cable to an overhead messenger.

The court decided with the plaintiff and held against the telephone company on the propositions of law raised by it.

IMPAIRMENT OF OBLIGATION—CONSTRUCTION OF PENAL LAWS.

In a case in the Federal Court in California the Sunset Telephone and Telegraph Company was held to have the right to operate in the city of Pomona without first obtaining a franchise from the city. This holding was based upon a state statute which provided that a telephone company might operate in the state under certain conditions and restrictions, the court holding that where a telephone company had accepted the provisions of the statute a contract was created between it and the state which was protected from impairment by the Federal constitution. The court's holding was to the effect that the company had the right to maintain its telephone wires in the streets of Pomona without obtaining a franchise, and the injunction suit which was brought to restain the city authorities from continuing the cutting down telephone wires was decided in favor of the company.

The Supreme Court of California had at one time held that the word "telegraph" as found in one of the penal statutes providing a punishment for any person who maliciously takes down or injures any line of telegraph, was broad enough to include within its meaning the word "telephones," and the Federal Court in this case followed the State Supreme Court's interpretation according to a rule of the said court.

INJURY TO EMPLOYEE FROM NEGLIGENCE.

The Supreme Court of Iowa in the case of Clark vs. Johnson County Telephone Company, reported in 123 *Northwestern Reporter*, at page 327, held that a trouble man, who, in an emergency, was directed to do the work of a lineman, was entitled to recover from the company for an injury which occurred to him while working as a lineman under the instructions of the foreman. It appears that an ice storm had worked havoc with the wires and that the plaintiff has been asked to work as lineman under the orders of the foreman. It appears that he had no knowledge of the danger of his position and the foreman gave him no instructions. He mounted a pole, cut wires from it and while so employed, it broke and he fell to the ground, seriously injuring him. A verdict for damages of $4,750 was rendered for plaintiff and an application was made to cut it down. The court held that because of the nature of his injury and the fact that several operations were necessary to place his arm in good condition, and because of the pain he suffered, the verdict was not excessive.

JURISDICTION OF FEDERAL COURTS.

The passage by a muncipal council of an ordinance and resolutions repealing a prior ordinance granting a franchise to a telephone company, ordering it to remove its poles and wires from the streets as a nuisance, and in the event of its failure to do so directing suit against it to compel such removal, does not constitute laws impairing the obligation of the contract made by the franchise ordinance so as to confer upon a federal court jursdiction of a suit to enjoin their enforcement. *American Telephone & Telegraph Co. of Alabama v. Town of New Decatur. U. S. Circuit Court, Northern District of Alabama.* 176 *Federal* 133.

DELIVERY OF MESSAGES BY TELEPHONE.

A telegraph company owes the duty to the public of exercising reasonable diligence in transmitting and delivering in due time messages received, and though the ordinary method of delivering messages is by messengers, and though the addressee is entitled to a delivery of the telegram received, the company must use the telephone, where its business and the settled rules of law do not require it to be prepared to promptly deliver the written message by hand. *Western Union Telegraph Co. v. Price. Court of Appeals of Kentucky.* 126 *Southwestern* 1100.

DISCONTINUANCE FOR NONPAYMENT OF RENT.

Under a contract to furnish telephone service for a month, renewable for another month on payment in advance, the telephone company, being a public service corporation, cannot refuse service to a patron who offers to pay the customary rental because he owed the company for a past month, which he had failed or refused to pay. *Southwestern Telegraph & Telephone Co. v. Luckett. Court of Civil Appeals of Texas.* 127 *Southwestern* 856.

RIGHT OF A TELEPHONE COMPANY IN STREETS.

Where a telephone company is authorized by its charter to do an interstate business, and uses its lines for that purpose, a right to build and maintain such lines in the streets of a city for that purpose, conferred by statute, is not limited nor affected by the fact that they are also used to transact local or intrastate business. *Sunset Telephone & Telegraph Co. v. City of Pomona. U. S. Circuit Court of Appeals.* 172 *Federal* 829.

CONVERSATIONS BY TELEPHONE.

The conversations, relating to a contract, had between the parties thereto by telephone, may be received in evidence, where the witness testifies positively that he recognized the person with whom he was talking, by his voice; and the probative force of such evidence is a question for the determination of the court or jury, as the case may be.—*National Bank of Ashland v. Cooper. Supreme Court of Nebraska,* 126 *Northwestern,* 656.

USE OF STREETS.

Where a town granted to a telephone company a license to erect its lines in the streets, etc., neither the town nor any municipality succeeding to its rights and powers over the streets and alleys within the town could repudiate the contract or take back the grant without the company's consent, nor could the company repudiate the contract.—*People ex rel Rockwell v. Chicago Telephone Co. Supreme Court of Illinois,* 91 *Northeastern,* 1065.

MUNICIPAL TAX ON POLES.

A toll of $2 per pole per year, imposed by a city on telegraph companies using its streets, is not a tax in the ordinary sense, but it is in the nature of a special charge for the use of the streets, and the expense and inconvenience caused to the city and the public thereby, and is reasonable in amount and valid. —*Western Union Telegraph Co. v. City of Richmond. U. S. Circuit Court, Eastern District of Virginia,* 178 *Federal,* 310.

DUTY TO SERVICE.

Where one tenders to a telephone company the charge for telephone service for a particular time and offers to comply with its reasonable rules, the company cannot refuse such service until a debt for past services is paid: it only having the right to demand a fixed charge for present service.—*Danaher v. Southwestern Telegraph & Telephone Co. Supreme Court of Arkansas,* 127 *Southwestern* 963.

GRANT TO TELEPHONE COMPANY.

A city cannot authorize a telephone company or other person to damage or destroy trees between the street and sidewalk belonging to adjacent property owners, without making compensation to such owner, though it may itself remove such trees, if they destroy the free use of the street, etc.—*Brahan v. Meridian Home Telephone Co. Supreme Court of Mississippi,* 52 *Southern,* 485.

DISCONTINUANCE OF SERVICE.

Under a contract for one month telephone service, renewable each month on the payment in advance of a stipulated sum, where no payment is made or tendered in advance, the service may be discontinued without any liability being incurred on the part of the telephone company *Southwestern Telegraph & Telephone Co. v. Luckett. Court of Civil Appeals of Texas.* 127 *Southwestern* 856.

UNLAWFUL DISCRIMINATIONS.

Charging new subscribers a higher rate than old subscribers for identically the same telephone service is discrimination in violation of Comp. Laws, Section 5270.—*Bradford v. Citizens' Telephone Co. Supreme Court of Michigan,* 126 *Northwestern,* 444.

Recent attempts to carry on telephonic communication between Berlin and London by means of both the Belgian and French cables are reported to have proven very unsatisfactory, as the conversation was scarcely audible. Extensive experiments will be carried on over the new French loaded cable and the results attained will determine the length of overhead line which can be connected with the cable and will also decide the possibility of connecting German cities with London telephonically by means of this cable. The lines connecting Berlin with Stralsundand, also with Frankfort-on-Main, are already provided with loaded coils.

Methods of Interior Block Distribution

By Irwin Johnson

THE following data on interior block distribution or ring wiring is given, not because it introduces any particularly noteworthy innovations, but because it represents the practice of most of the larger telephone companies, and as such, should be interesting to those who are planning the construction or installation of telephone lines.

While ring wiring, as ordinarily practiced, presents no extraordinary problems, like everything else it has its right and its wrong ways, as well as its varying degrees of excellence and sightliness, showing the good workman and his opposite. A suggestion of standard practice, such as is embodied in these considerations, may make a good workman of a poor one.

GENERAL.

In blocks well built up, where the walls present in general a continuous surface, wires or cables can be attached to the walls.

In all construction of this character, care should be taken not to injure or deface private property, and all work should have a neat appearnce and should be as inconspicuous as possible.

In all wire work the greatest care should be taken to avoid injury to the insulation of wire, not only in handling but also in providing supporting devices sufficient in number. Wires and cable should be kept free from contact with foreign conductors and mechanical obstructions. Mechanical protection should be placed where necessary.

The wires should be flipped over the rings and pulled down into their centers and not drawn through and should be tight enough to avoid unsightly sags, but not sufficiently tight to cause an excessive strain.

LOCATION OF WIRES AND CABLES.

In business blocks, cables and wires should in general be located on the rear or side walls of the building. In special cases they can be carried through the dividing walls from cellar to cellar, or from vault to vault under the sidewalks.

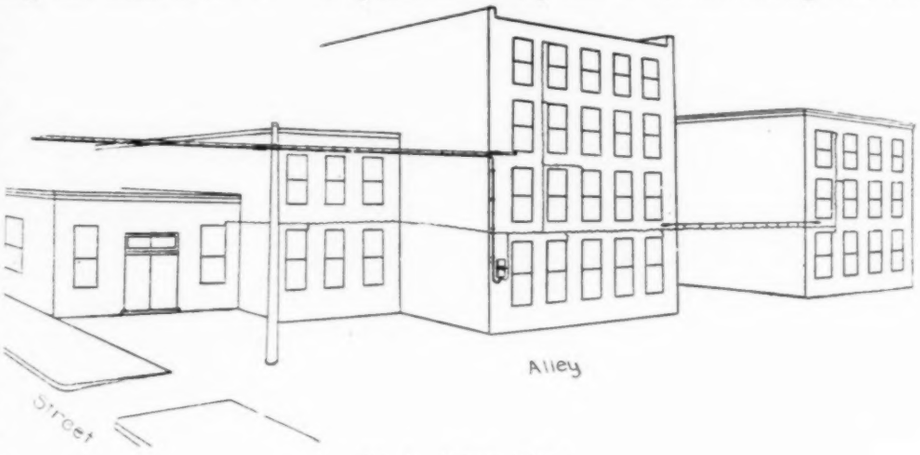


Fig. 2. Outside Wiring.

Runs can sometimes be made along the fronts of the buildings over doorways and windows particularly in the case of old buildings, without injuring the appearance of the building.

In distributing to residences, cables or wires can be located either on the rear portions of the house or on the fences if these are available and substantial.

Cables and wires should be located as far as practicable so as to be accessible without the necessity of the employes entering the buildings. Where practicable, all wires should be over ten feet above the ground and the runs should be either horizontal or vertical with as few corners as practicable and should not be placed on party walls which are likely to be built against in the near future.

Contour lines of the buildings should be in general followed, except where considerable economy can be effected by properly suspended runs between neighboring buildings.

It is better to run the wires low where they can be reached with a short ladder than to run them high where they are only accessible from the roof or upper story windows.

The runs should be planned so that as large a

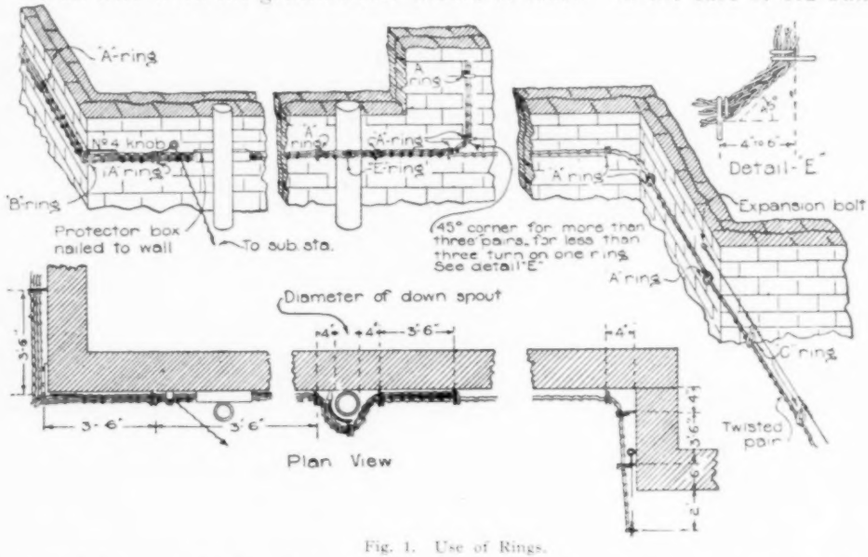


Fig. 1. Use of Rings.

number of wires as possible can be placed in the same run and so that the length of the wires shall be as short as possible.

WIRE AND RINGS.

Best practice requires that all wire used for ring wiring shall be No. 18 B. & S. rubber covered and braided twist pair bridle wire, and all joints therein, except party-line taps, should be Western Union soldered joints or their equivalents and well taped and staggered six inches from each other.

All rings used should be galvanized and made in two types : Type "A," for straight work on walls, and Type "B," for turning projecting corners. The use of each type is shown in Fig. 1.

Type "A" rings can be best attached to brick or stone walls by means of 5/8-inch by 1 1/8-inch composition expansion shields, and should be screwed directly to wooden walls. These rings should be turned so

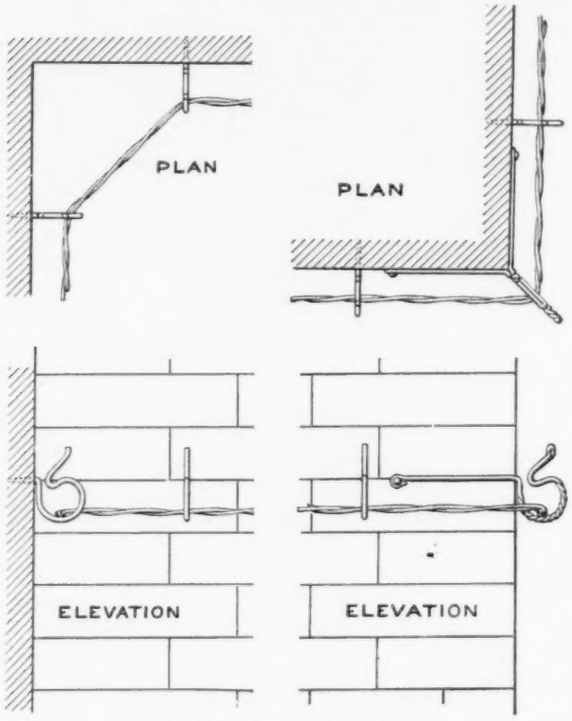


Fig. 3. Turning Corners.

that they are at right angles to the direction of the wires they are to hold.

When the line of rings is in a horizontal direction, the rings should be turned so that the opening is at the top. On bends the opening should be on the outside of the bend.

Type "B" rings should be fastened to the brick walls by two 10-penny cut nails, driven into the mortar, and on the wooden walls by means of two 3/4-inch flat head bright screws.

All rings should be spaced in such positions that as large a number of wires as possible may be carried in the same line of rings, and so that the length of the wires shall be as short as possible.

The rings should be located three feet six inches on centers, except on vertical runs intended to carry only three pairs of wires, when the spacing can be increased to not more than seven feet on centers.

At corners projecting outward the rings should be spaced the same distance from the corner rings as on straight walls. At corners projecting inward, rings should be placed on each wall four inches from the angle in the wall.

When the ring wiring makes a right angle turn using Type "A" rings, the turn should be made on two rings in order to lessen the strain on the insulation, see

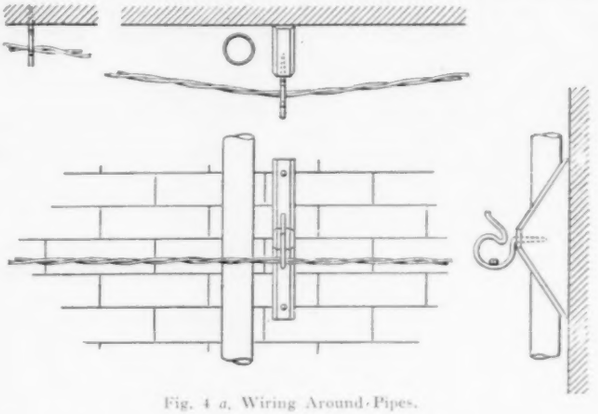


Fig. 4 *a*. Wiring Around Pipes.

Fig. 1. When the branch wires will not exceed three pairs, the turn can be made on one ring.

Care should be taken in locating rings to avoid places where the cable or wire is liable to be injured by dripping water, hoists, etc., where a rain spout, metallic pipe or similar obstruction interferes, or where there is danger of contact with electric light or power leads.

RAIN SPOUTS, PIPES, REAR STAIRWAYS, ETC.

When possible the wires should be placed between the obstructions and the wall and if a two-inch clearance or protection cannot be obtained they should be protected by a protector box securely attached with 20-penny nails. The box should extend not less than two inches on each side of the obstruction.

In case it is necessary to carry the wires around the obstruction, wooden house blocks can be attached to the wall sufficient to give the proper clearance, and

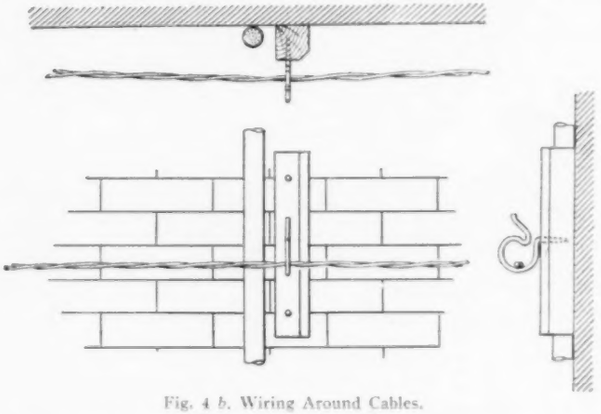


Fig. 4 *b*. Wiring Around Cables.

a Type "A" ring fastened to each side of the obstruction and four inches from it. See Fig. 4.

In passing stairways or fire-escapes special care should be taken to place the wires and their protection in such a manner as to prevent the wires from being trampled on and the insulation injured.

In passing telephone or telegraph cables, or small

projecting pillars or pipes, the rings can be placed on small house blocks in order to pass over and clear the obstruction, the clearance should not be less than two inches. (Fig. 4.)

LIGHTNING CONDUCTORS, ELECTRIC LIGHT OR POWER WIRES.

Where it is impossible to obtain a clearance greater than six inches from an electric light or power circuit, the telephone wires should be protected by means of split porcelain tubing extending not less than six inches on each side of the crossing, and, when possible, fastened to the wall with a pipe clamp so the tubing is held together and the ends protected with several wraps of tape, which also prevents the tube from being broken by clamps. The tubing should be placed on either the foreign conductors or on the wires, as seems most practicable for each case. Tubing can be ordered in one piece or split with one-inch holes and four, eight and twelve-inches in length.

Where the foreign conductor swings quite close to the wire so as to be dangerous, the conductors should be tied to standard glass insulators mounted on iron drive brackets.

RING-WIRING ACROSS OPEN SPANS.

Where vacant lots interfere or where it is desirable to extend the wires across alleys, or where the character of the building is such that it is not desirable to fasten wires to it, and the space is greater than six feet, rings crimped and tied to a No. 6 iron wire, spaced two feet apart should be used for spanning the gap. (Type "C.") The suspension wire should be attached to the walls and deadened in a 3⅜-inch malleable lag eye bolt fastened in the bricks with expansion shields.

This method should be used for wires and also for cables when smaller than 30-pair No. 22 gauge where the span is less than forty feet. When placing such wires as are necessary for existing conditions, one strand of three-ply house line should be pulled in the rings with the wire to be used for pulling future wires. In pulling in additional wires, a new strand of house line should be pulled in each time to replace the one pulled out.

Where it is necessary to extend the cable across alleys or empty lots, and wires do not run parallel to the cable, the cable should be suspended on the wire by means of cable clip. Where both wires and cables are used at the same crossing, the cable and wire may run through the same ring. (See Fig. 1.)

DEAD ENDING AT STATIONS.

To prevent the wires pulling back and sagging in the horizontal spans, the wires should be secured at both ends. Each pair of wires should be twisted once around the pair of wiring rings outside the box. In all cases sufficient slack should be left between the dead end and connecting terminals in the box so that each pair of wires will be long enough to reach any terminals in the box. The necessary slack for this should be neatly arranged by looping the extra length through the wiring rings. At the entrance to the subscriber's premises the pair of wires should be fastened with a twist to one wiring ring, placed close to the point of entrance. Sufficient length should be left for the wires after forming a drip loop to reach the connecting block or protector on which the inside wiring is to terminate.

PARTY LINE TAPS.

For economy in wiring, taps should be made where possible at those points of the run from which the distance to the point of entrance to the party line subscribers will be the shortest. The tap should be twisted once around on the proper wiring ring of the run and the ends bared and connected to the party circuit by means of test connectors. The two connections should be staggered six inches and at least six inches from the nearest ring or knob.

AERIAL DROPS FROM RING WIRING.

Occasionally it is convenient to reach a detached building by an aerial drop extending from the ring wiring on an adjacent building. In such cases a No. 4 knob should be attached in the usual manner to the main building at the proper height and the ring wiring should extend to the knob, the drop being fastened to the knob in the usual manner. In case the drop is less than forty feet long, No. 18 bridle wire can be used, but if longer, No. 14 twisted pair wire should be used and connected to the No. 18 bridle wire in the rings.

FROM POLE TO BUILDING.

In cases where six or more wires are to be run from a pole to a building, the same method should be employed as is used in spanning over spaces. Care should be taken to fasten the wires at the pole to prevent them sagging in the span, and sufficient ends should be allowed to connect the pairs to proper terminals in the box.

Morgan Making Valuations

J. P. Morgan & Co. has placed accountants at work on the books of the various telephone properties which the firm controls in Ohio and a most complete examination of them will be made. The Morgan properties include the Columbus Citizens' Telephone Company with its subsidiary companies, the Franklin County, the Washington Home and the London Home Telephone Companies, the Toledo Home Telephone Company, the Dayton Home Telephone Company and the United States Telephone Company with its eleven subsidiaries.

The reports of the accountants will show the true physical valuation of each company, together with its estimated earning capacity and the examination is preliminary to plans for the rehabilitation of the companies and the bringing of all of them up to a standard of efficiency. The Columbus, the Toledo and the Cleveland Companies are already in high state of efficiency, but the others will require a large expenditure of money to put them in first-class condition.

Nothing will be done towards a consolidation of the Morgan properties under one company until this rehabilitation has taken place. When the companies are in good condition then a new corporation will be formed to take them over and the stock and bonds of such a company will be easy for the Morgan firm to handle, where it would be impossible to sell securities of the separate companies to advantage. It is not probable that any steps towards the actual formation of the new company will be taken until some time next year.

A chief, selected from the state civil service list, will be appointed in the near future, to take charge of the telephone duties, Second District of the New York Public Service Commission.

What One Woman Thinks

By Sarah Elizabeth Brown

I AM beginning to doubt whether the public will "fall" for this courtesy thing the telephone companies are advocating. American men haven't been brought up right. Women are usually more considerate in their conversation than the men and I'm sure that I know why. Courtesy must evolve from present teaching. It will probably bear fruit after we are through with the present lack of it.

If you will go into the average home where children are, father will call his little baby bunting a ruffian, upon any provocation. That's father's way. The mother is blamed for the short-comings in her precious darling from babyhood to manhood. It's all mamma's fault! Father wants his boy to be a little man. He doesn't want a sissy kid. He buys toys that make a racket—something to beat or throw. When the little chap is big enough to play with other children, papa's boy must be the bully; he must kick and bite and scratch; take his own part. When old enough to comprehend, tales of pap's boyhood valor filter into the little ears and the wide-eyed, open-mouthed child is amazed—spurred into bigger and burlier undertakings.

Does papa teach his son to rise when ladies enter the room; take off his hat when he meets Dolly on the way to school? Not in a thousand years! He is training sonny to be a brow-beater when he gets to the telephone! The baby training gives us the average American who lacks telephone courtesy because there is none of it in his system.

When fathers will help the mothers raise the boys, it will require less advertising to tell men how to use a telephone. It is no task to be polite if you have been "raised" that way.

* * *

When the hope of the white man was knocked galley-west at Reno, he added a pet phrase to our vocabulary. He couldn't come back. I have been thinking about some of the manufacturers who used to rally 'round the annual conventions and it occurs to me that there may be mighty few operating companies that fail but there is quite a plenty of manufacturers that used to be, but which are painfully shy today. While in this mood I saw an item in our copy of the Chicago *Record-Herald*, announcing a receivership for the old Western Telephone Manufacturing Company, which I remember as the pioneer of them all. I believe they used to call it the Western Telephone Construction Company when Jim Keelyn sat in the front office. It ran a long race to dwindle down to $18,000 worth of debts and only $7,000 assets. It is the first independent factory failure I ever ran across, but I am wondering what became of the Hipwell Manufacturing Company and Harry Hipwell, the Williams Electric Telephone Company, the Williams-Abbott Electric Company and Louie Sands, the Standard Telephone and Electric Company, the Acme Electric Company and Meissner and Walsh, the Fisk-Newhall Telephone Manufacturing Company, the Farr Telephone and Construction Supply Company and Charlie Farr, the International Telephone Manufacturing Company and Henry Shafer, the Kokomo Telephone and Electric Manufacturing Company, the County Home Telephone Manufacturing Company—the dear old name and Sipperly, not slippery, and a lot of others? Can't they come back? It was only seven years ago that these I have named were very much alive—all doing business at their old stands. Jim Parish, of the Standard, has passed to the great beyond where they don't use telephones, or at least there is no record on the subject. At any rate if the telephone has preceded us let us hope they are all one brand—either solid gold or asbestos and that the trouble is being taken care of by the fire department.

* * *

Not a peep from Aurora or Wheeling or Columbus! Dog days are always exasperating. Nothing stirring but the flies. What is there to write about?

* * *

I have recently come across some information about receiver's certificates that was so interesting to me that I'll set it down here to help some poor struggling brother who may be seeking the light in Mt. McKinley finance. You have heard of these receivers' certificates, of course? They are turning the wheels of some of the factories. In Chicago, Omaha and Harrisburg they have oiled the rusty bearings of some telephone enterprises. When a public service corporation is hard aground and the tempest of collectors and bondholders threaten the bark, there is salve in a receivership. This is terrible, but true. The practice as now applied to telephone companies grew out of the railroad business. The United States Supreme Court places the lien of receivers' certificates ahead of first mortgage bonds, because the money must all be sent back into the property, thus increasing the security. And the court also holds that in many instances, money is necessary in making extensions before a property can be self-supporting. Having nothing but railroad cases as examples, they are here set down in the language of the court:

> Property subject to liens and claims and debts, of various characters and ranks, which is brought within the cognizance of a court of equity for administration, and conversion into money, and distribution, is a trust fund. It is to be preserved for those entitled to it. This must be done by the hands of the court, through its officers. The character of the property gives character to the particular species of preservation which it requires. Unimproved land may lie idle, with only payment of taxes. Improved property should be rented. Movable property that is not perishable may be locked up and kept; but if perishable, it must be sold by way of preservation. A railroad and it appurtenances, is a peculiar species of property. Not only will its structures deteriorate and decay and perish if not cared for and kept up, but its business and good will will pass away if it is not run and kept in good order. Moreover, a railroad is a matter of public concern. The franchises and rights of the corporation which constructed it were given not merely for private gain to the operators, but to furnish a public highway; and all persons who deal with the corporation as creditors or holders of its obligations, must necessarily be held to do so in the view, that, if it falls into insolvency and its affairs come into a court of equity for adjustment, involving the transfer of its franchises and property, by a sale into other hands, to have the purposes of its creation still carried out, the court, while in charge of the property, has the power,

and, under some circumstances, it may be its duty, to make such repairs as are necessary to keep the road and its structures in a safe and proper condition to serve the public. Its power to do this does no depend on consent, or on prior notice.

The only other material objection made by the appellant to the decree, not already disposed of, is, that it declared the amount due on the Receiver's Certificates to be a lien on the property in their hands prior to that of the first-mortgage bonds. The history of these certificates has already been referred to. The receivers were authorized by the order appointing them, amongst other things, to put the road in repair and operate the same, and to procure such rolling-stock as might be necessary; and for these purposes, to raise money by loan to an amount named in the order, and issue their certificates of indebtedness therefor; and the order declared that such loan should be a first lien on the property, payable before the first mortgage bonds. The power of a court of equity to appoint managing receivers of such property as a railroad, when taken under its charge as a trust fund for the payment of incumbrances, and to authorize such receivers to raise money necessary for the preservation and management of the property, and make the same chargeable as a lien thereon for its payment, cannot, at this day, be seriously disputed. It is a part of that jurisdiction, always exercised by the court, by which it is its duty to protect and preserve the trust funds in its hands.

* * *

Receivers' certificates are the fairy godmothers of some independent concerns that have waded into deep water. Frank Houck and Charlie West, receivers of the American Union Telephone Company, are spending a cool hundred thousand where it will do the most good. From this amount, $37,850 of pressing obligations were ordered paid—the receivers are authorized to secure extensions of payment on other claims and fix up the property with the remaining funds. West has resigned his position as paymaster of an eastern telephone paper. His experience, derived from this connection, ought to qualify him as an ideal receiver.

* * *

A year ago *Telephone Securities Weekly* was bitterly antagonizing every movement of the American Telephone and Telegraph Company in its plans to finance itself. Mr. Latzke went so far with his plans as to hints that great financial houses and bankers were stultifying their own and clients' interests by endorsing some things without full knowledge of facts. He hinted that the Bell Company was paying such enormous compensation for misrepresentation that they dared to take a chance. I wish, brother, you would look at *Telephone Weekly*, August 20, this year. For fear you haven't a copy handy, here are some favorable headings that suggest a different point of view: "Chicago Telephone Company Make Good Station Showing, for July and Seven Months;" "Southern New England Bell Gross Increases;" "Cumberland Bell Wins Over Landis;" "Anglo-American Telegraph Company Directors Favor Closer Arrangement with A. T. & T. Company;" "Canadian Bell Gets Franchises;" "Central Union Bell Plans New Exchanges in Dayton, Ohio—to Provide for Twenty Years Growth;" "Hotel Installs 500 Stations"—this is Hotel Statler, Buffalo—the service is Bell—"The Western Electric Company said to be Running at Rate of $61,000,000 for Current Year," "$100,000 in Shreveport Improvements"—Cumberland Bell item—"Gets Permission to Lay Conduits"—American T. & T. item—"Bell Adds Many Subscribers"—Pacific T. & T. Company at San Francisco. These are all "favorable" comments. The technical text of this issue is very largely from Bell sources and the crack of Latzke's whip has been utterly cast off.

Congress has declared telephone and telegraph companies doing an interstate business to be common carriers. As such they rightfully come under the jurisdiction of the Interstate Commerce Commission. Well, here we are, right solidly up against it. I have heard that very competent authority holds that any local telephone company having long distance connections with other companies outside its own state is doing an interstate business and becomes a common carrier under the Railway Act. That will let us all in, won't it? Another thing, there will be no more franks, under penalty of $100 to $2,000. I guess that will hold out the dead-head, alright. But the thought of common carrier is far-reaching. I'm not long on prophesy, but I'll wager a red-hot doughnut that every state, as fast as legislatures can act, will pass physical connection laws and demand the delivery to destination of any conversation—no matter where it originates. There will be universal service, but with competition, my dear, remember that.

* * *

And I fancy this thing they are planning in Michigan is part of the new order of things. Announcement comes out of Ann Arbor that a merger of fourteen small independent companies is contemplated. The new corporation is to be known as the Home Telephone Company of Michigan, capital $4,000,000. It is alleged that the Commonwealth Trust Company of St. Louis is behind the deal and it is one of three similar organizations for the lower peninsula. If we are all doing an interstate business, it will be well to stick closer together and, when possible, acquire strength to meet our big competitors. The telephone business is getting better.

* * *

Will some one please tell me why the Bell urges interconnection with independents and offers as a climax a stingy little annual contract for a trial? If it is in dead earnest, these contracts should cover a period of fifty years or more. Then the local operator would rest secure in his position and have assurance of permanency. Why the sop of a single year?

* * *

What becomes of all the restraining orders and injunction proceedings? It may be plain curiosity that makes me ask questions that I can't answer, but I would like to know. I see that the Kinloch L. D. Telephone Company prayed for and secured an injunction against the Central Union because it had gobbled up the system at Vandalia, Illinois. I wonder, too, why the Bell never kicks when one independent company absorbs another.

* * *

It is reported, on the authority of eastern directors of the company, that American Telephone and Telegraph will soon make a new issue of capital stock. The amount to be offered is not stated. A small amount will be required, of course, to take over the common stock of the Michigan State Telephone Company, for which an offer of exchange was made recently. It is understood, however, that the company intends to put out enough stock to meet some very substantial capital requirements.

The company is gradually absorbing the important Bell lines throughout the country. The stockholders recently authorized an increase of $200,000,000 in the capital stock to a total of $500,000,000.

Recent Telephone Patents

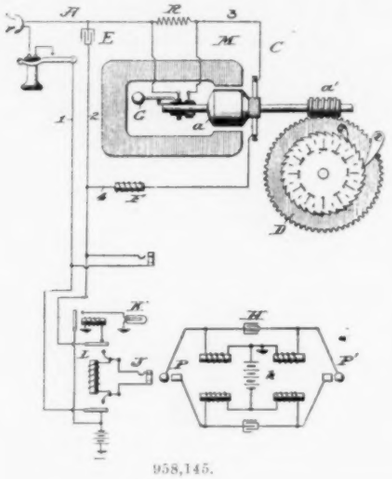
By David S. Hulfish

958,067. Intercommunicationg Set.—In the switching device is provided a movable contact for the telephone set and a large number of fixed contact points for the lines of the system, together with locking devices for holding the movable contact in position, when it is adjusted for a call. The novelty in the present patent is found in the feature of bringing the locking device into service when a ringing key is used and releasing it by hanging up the receiver to permit all parts to return to normal position. A. K. Adrians, San Francisco, Calif., assignor to Direct-Line General Telephone Company of same place.

958,145. Telephone Meter.—The device illustrated is exceedingly crude, but the claims are broad and self-explanatory. "A time-regulating device, an electric motor for driving the same, speech transmitting and receiving instruments, and circuit connections completed by initiating the use of said instruments to operate said motor." Ray H. Manson, Elyria, Ohio, assignor to Dean Electric Company, of same place.

958,167. Transmitter.—The improvement is found in the hinge or knuckle joint. Niels Pedersen, Genoa, Illinois, assignor to Cracraft-Leich Electric Company of same place.

958,224. Signaling System.—Harmonic ringers (or the equivalent, harmonic relays) are used at the substations and current for operating them is generated by a tuned vibrating armature and a transmitting electromagnet at the central office. Louis W. Carroll, Anamosa, Iowa.



958,145.

958,248. Party Line System.—A selective system in which the selection is attained by step-by-step devices at the stations. Each station is provided also with an impulse controlling device whereby any station may cause to be sent upon the line the necessary impulses to select and call another desired station. Leonidas E. Hicks, Stinson, W. Va.

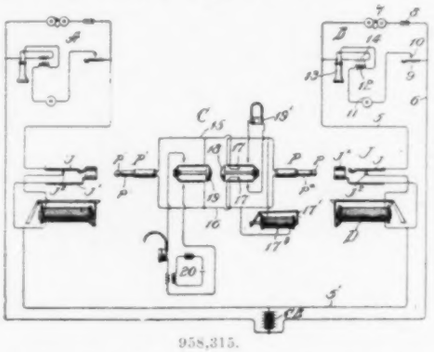
958,315. Telephone Switching System.—All lines of the switchboard are connected together and to one pole of the battery without impedance. The return limbs are connected for conversation as desired and the return circuit completed through a supervisory signal. Earl C. Rodman, West Point, Iowa.

958,453. Indicating Ringing Key.—The cam or plunger of the key occupies the same position whether the indicating button of the key is in its normal position or in its indicating position. Lynn A. Williams, Evanston, Illinois, assignor to the Stromberg-Carlson Telephone Manufacturing Co., Rochester, New York.

958,560. Telephone Repeater.—This patent pertains to a circuit adapted for a duplex resistance button devised by the same inventor. It provides also against singing or back talk among the local circuits of the connected telephone lines. Pietro Stragiotti, Hurley, Wis., assignor of parts to Griffith Thomas, Joseph Vercellini and Frank Marta, of same place.

958,561. Telephone Circuit.—A substation circuit containing a bridge having a differential microphone in series with an impedance coil. Pietro Stragiotti, Hurley, Wis.

958,627. Telephone Switching System.—The connecting cord circuit of a manual multiple common battery board is so arranged as to shunt out the line relays and extinguish the line-lamp signals. Charles L. Goodrum, Atlantic City, N. J., assignor to P. C. Burns, Chicago, Illinois.



958,315.

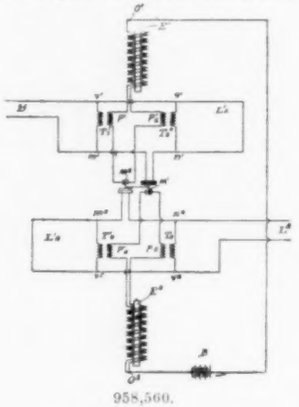
958,847. Selective Call Device.—The tapper of the ringer at a selective station is obstructed against movement until the selective device is moved into a predetermined position. William E. Zabst, Portage, Wisconsin.

958,856. Trunking System.—The trunk circuit includes a repeating coil for renewing the supply of current for common battery transmission, and comprises signal controling means for supervision by the A-operator end of the trunk. William W. Dean, Elyria, Ohio, assignor to Dean Electric Co., of same place.

958,863. Register.—The device is adapted for party lines. The central office meters register separately the calls from the different stations of the party lines. Circuits and mechanism are shown adapting the system to automatic telephone systems. Alfred H. Dyson, Chicago, Illinois, assignor to Kellogg Switchboard and Supply Company, of same place.

958,868. Telephone System.—In the substation telephone set is included a relay operating to change the set from speech-receiving adjustment to speech-transmitting adjustment, the relay being operated automatically when the transmitter is spoken into. William F. Gradolph, St. Louis, Mo., and William C. Hahne, Chicago, Illinois, assignors to Gradolph Electric Co., of St. Louis, Mo.

958,894. Party-Line System.—A party line composed of a solid wire and a sectional wire, the sectional wire in operation being built up solid to the station desired. Homer J. Roberts, Evanston, Illinois, assignor to Homer Roberts Telephone Co.



958,560.

958,979. Desk Stand.—The hookswitch is within the vertical column of the stand. The column cap and transmitter are removable by jack connections. Burton W. Sweet, Cleveland, Ohio, assignor to Harry Z. Sands, of same place.

Making Hard Rubber for Telephone Uses

By F. S. Malm

THE process of manufacturing hard rubber is unusually interesting. In the development of hard rubber for its own use the Western Electric Company has done extensive experimental research work, and has developed grades to meet all of the exacting requirements of the telephone art. When hard rubbers were being purchased on the open market it was found that some grades were inferior and others superior to the quality which was actually needed for the various purposes. The company can now save the profits it formerly gave the supplier and use grades of rubber which may be hard or flexible, depending upon the particular use to which it is put.

For instance, a special grade of rubber is used in making telephone jack mounting strips. These are made flexible and strong, otherwise they would not withstand the drilling and milling operations required to make a mounting strip taking up the least possible space, and in which enough electrical apparatus is terminated to facilitate the calling of twenty telephone subscribers. The various sizes of rubber needed for insulating the electrical apparatus used represent sheet, rod and tube rubber from a fraction of an inch to several inches in thickness. The milling of these rubber parts to size necessitates using especially designed tools and machinery.

In order to give the unacquainted a brief description of crude rubbers, their habitat, growth and manufacturing uses, it will be well to describe a few interesting points.

Rubber is a product of several species of rubber-producing plants, namely, trees, vines and shrubs. They occur in the torrid zone, but the rubber that

Rubber Inspection Department.

comes from different parts of this vast belt differs greatly in its physical and chemical properties. Rubber results from the juice of a tree or vine and the juice is called "latex," which is a milk-like fluid holding small globules of rubber in suspension and other substances in solution. The latex is obtained by cutting incisions into the bark of the tree and allowing it to drip into receptacles, after which the rubber is separated out by coagulation.

Para rubber coming from South America is the best quality of all rubbers. It results from the latex taken from the gigantic tree, the *Hevea Braziliensia*. Para rubber which the Western Electric Company uses comes in the form of large biscuits which emit

Section of Vulcanizing Room.

an odor similar to smoked ham, and it possesses a strength and elasticity which is unapproached by any other grade of rubber. It contains approximately twenty per cent of water, and a small amount of dirt and other impurities which must be entirely eliminated before it can be used in hard rubber manufacture. Numerous grades of rubber come from Africa, Asia and the Island of Madagascar. Most of these grades result from the latex of the giant vine of the *Landolphia* species.

In spite of the best methods of coagulation, it has been found impossible to rid the rubber of such impurities as sand, bark from the trees and water which causes the high shrinkage of most rubbers which we receive upon the market. All lots of crude rubber coming to the company's plant are inspected, and, owing to the fact that all rubbers vary in cleanliness, the dirtier portions are given special attention in the washing operations. The crude rubber is first softened in hot water, this being done in a large steel tank with a capacity of several tons.

The washing equipment consists of washing mills provided with corrugated rolls, and a water pipe carrying wash water running parallel to the rolls along their whole length. The pipes are perforated and thus allow a constant stream of water to play upon the rubber while it is being passed between the rolls. The time required to wash crude rubber properly will depend upon its condition, as in every instance it must be done so effectually that after being washed and dried the rubbers must show a percentage of mineral matter under a certain definite

figure before it can be used. In this way all contamination of hard rubber with such injurious substances as sand and bark will be removed. After the rubber has been thoroughly washed, it is passed between the rolls of a finishing mill, where it is rolled down to a thickness of one-eighth of an inch.

It is absolutely necessary that all rubber before being put into a mixture shall have become perfectly dry. To accomplish this a large drying room, provided with racks upon which the sheeted rubber is hung until dry enough for use, is employed. The time for drying varies with different grades of rubber. The dry room is equipped with heating pipes and means of ventilation so that the temperature may be controlled at all times.

Hard or soft rubber can be made by varying the percentage of sulphur, but the proportion of forty per cent of sulphur and sixty per cent of rubber, vulcanized at the proper temperature, will produce the best hard rubber. Nothing can be found which can be used so effectively for a vulcanizing agent as sulphur. The sulphur used in making hard rubber is that known commercially as flowers of sulphur. It is the ordinary octahedral sulphur, melting at 238 degrees Fahrenheit. Commercially it contains a small amount of moisture and also from .1 to .2 per cent of sulphuric acid which has been formed by oxidization. The combination of sulphur and rubber is brought about mainly by heat. No vulcanizing action at all takes place before the melting point of sulphur and it proceeds very slowly at temperatures under 250 degrees Fahrenheit. The nature of vulcanization is very little understood. Some claim it is a solution of rubber in sulphur, others that sulphur merely adds itself to rubber as an additional product similar to action of sulphur upon certain vegetable oils. Others again say that the process is a substitution process and that sulphur replaces part of the hydrogen in the rubber, with the formation of hydrogen sulphide. The most plausible of all these explanations at the present time is the second, that vulcanized rubber is an additional product of rubber and sulphur. When a piece of rubber is vulcanized properly with sulphur, no evidence of sulphur can be seen in the piece. Even upon heating above the melting point of sulphur no sulphur globules can be seen oozing from the piece. That the sulphur has changed is evident, for when the same piece of vulcanized rubber is extracted with boiling acetone in which sulphur is soluble, only a small part of sulphur can be dissolved out. When hard rubber contains more than 33 per cent of sulphur the balance will remain in the free state.

In making hard rubber at the Western Electric Company's plant the requisite kinds of rubber and the required percentage of sulphur are weighed out and thoroughly mixed on mills. The resulting mixture is cut from the mills, rolled into convenient sized lots and is taken to the various departments where it is to be made into hard rubber parts. Hard rubber sheets are made in the well known way, by warming up on the mill and calendering the rubber to size. The equipment consists of a large calendar, which is a machine used for rolling the rubber out into a definite size sheet. The sheets of rubber are in turn placed in cars and put into large vulcanizers. These vulcanizers are heated by steam, the heat being increased very carefully and gradually. The length of vulcanization depends, of course, upon the size and quality of the sheets to be made. The product of vulcanization depends, of course, upon the size and quality of the sheets to be made. The product of vulcanization now becomes a sheet which is hard and elastic and which possesses a beautifully polished surface. Upon cooling sheets are trimmed, if necessary, and sometimes buffed and polished. As a final operation these sheets are inspected and carefully gauged for size.

Some Uses of Hard Rubber in Telephone Making.

Rods and tubes are made from rubber mixtures on regular tube machines, which consist of a steam jacketed cylinder in which a forcing screw is revolved

causing the rubber which is fed into the cylinder to be squirted out through a sizing die. After this operation they are vulcanized in similar vulcanizers to those in which sheets are made. The tubes are made similar to rods with the exception that the central hole is formed by the aid of a pin in the tubing machine. After leaving the tubing machine the tubes are placed on steel rods on which they are vulcanized to obtain a tube with definite size hole. The rods and tubes, after vulcanizing, are finished to size and if necessary, buffed and polished. The finishing is done on special polishing and buffing wheels, using different kinds of polishing agents to obtain the desired finish on the various grades of rubber.

Hard rubber receiver parts are made from rubber mixtures which are milled and calendered as for sheets. These sheets are then cut into blank pieces which are placed into metal dies, pressed into the required shape and vulcanized. The dies in which these parts are vulcanized are placed in a steel form so arranged that a certain number of dies can be heated at the same time. The mixtures of rubber used are, of course, adapted to the particular use to which the parts are put. These dies are held to the most exacting dimensions of the modern tool room, to eliminate the possibilities of any defective workmanship which might result in the making of hard rubber parts from these. After the parts have been vulcanized they are removed from the dies and put through the finishing operations, which consist in bringing them down to size with the assistance of every possible labor-saving machinery.

Observations on American Systems

By Major W. A. J. O'Meara*

THE success of the American in engineering and commercial enterprises is widely acknowledged, and I therefore endeavored to ascertain during my hurried journey through the United States and Canada to what this success could be fairly ascribed. I have no hesitation in stating that from September 16, the day I investigated the organization of the New England Telephone Company in Boston, and the methods adopted by its officers in handling telephone propositions, to December 21, that last day which I spent at the offices of the American Telephone and Telegraph Company in New York with Mr. J. J. Carty, I was struck by nothing more than the broad-mindedness of the officials engaged in the telephone and telegraph industries of the New World, and the orderliness in the management of those undertakings behind the scenes to which I was, through generosity and kindliness, allowed to penetrate.

On the North American continent the telephone and telegraph systems are ranked among the engineering enterprises of the land, and it is therefore not surprising to find the prominent position which is accorded to the engineering department in the organization of the American Telephone and Telegraph Company. In the words of Mr. Theodore Vail, the president of this company: "The engineering department takes all new ideas, suggestions and inventions, and studies, develops and passes comments upon them. It has under continuous observations and study all traffic methods and troubles, improving or remedying them. It studies all construction, future development and extension schemes, makes plans and specifications for the same, and gives, when desired, general supervision and advice."

While I was in New York I had many opportunities of closely watching the working of the great deliberative machine so ably presided over by Mr. T. Vail, and so well managed by Mr. H. B. Thayer, one of the vice-presidents of the company. The first thing which naturally attracted attention was the complete absence of the huge files of correspondence so familiar to those who work in government offices. The functions of the various departments of the American Telephone and Telegraph Company are very clearly laid down, and since decentralization exists in its completest forms, the business of the company is transacted by the heads of departments in personal interviews with the president and vice-president. It is this procedure which accounts for the absence of the files of correspondence to which attention has been drawn, and to it is also due the fact that the staff attached to the offices of the president and vice-president are reduced to microscopical proportions. In the case of the American Telephone and Telegraph Company I understand that about half a dozen stenographers comprise the whole of what would constitute the administrative section in a large British public department. Another point which came under my observation was the close personal relationship which exists between Mr. Carty and the chief engineer of the Western Electric Company, Mr. C. Scribner. When one considers the character of the problems which telephone and telegraph engineers have to handle nowadays it is not difficult to realize how great must be the advantage which cannot fail to result from the close personal intercourse of the chief engineers of the manufacturing and operating departments of the American Telephone and Telegraph Company.

Mr. Carty's mission is to provide for the handling of telephone traffic in an efficient manner; it naturally follows that one important sub-division of his department devotes itself to the study of traffic questions. A second sub-division deals with questions relating to equipment, etc., by means of which the traffic must be handled. The work of these two sub-divisions is closely associated, as the problems of the one interact on those of the other. In order to produce the highest efficiency with the greatest possible economy it is absolutely necessary to consider the traffic problems in relation to the design of equipment and vice versa. Mr. Carty put it well when he informed me that his responsibilities "covered the design of the guns and ammunition, and also the manner in which the ammunition was to be used and the guns fired." But he further impressed upon me the fact that his responsibilities did not end here. For, if a telephone under-

*Abstract of an article in the *"Postoffice Electrical Engineers' Journal,* London.

taking is to be a commercial success, it is a further duty of the engineer to follow carefully every change in the commercial policy of the company with which he is associated, since matters relating to tariffs, concessions, etc., all in turn produce reactions both on the internal equipment and external plant, and such reactions often demand important modifications in the engineering plan to meet the altered traffic requirements arising from a change in policy.

In America a commercial department has been instituted for selling telephone service. Secondly, in order to enable the telephone companies to fulfill their part of the contract after the bargain for the service has been entered into, the necessary equipment and plant have to be designed, installed and maintained; the responsibility for this work is provided for by the plant department—*i. e.*, the engineering department as known in our service. Finally, when the equipment and plant are in position it necessarily follows that measures have to be adopted for bringing them into service, and the responsibility for this work is placed upon the traffic department. A feature of this organization which struck me as admirable lies in the fact that the heads of these three departments have the same title, viz., that of superintendent—that is to say, they are on the same level as to rank, and thus human sentiment is very largely cared for. It is safe to say that with such an organization business getting will be much more effectively organized and carried on; the equipment and plant will be better designed and constructed, and maintained at lower cost, and the operating will be of higher quality and exhibit greater efficiency. The concentration of effort, the conserving of special skill, the co-ordination and co-operation within each functional department, will also tend naturally to the acquisition of the greatest efficiency in each department of work.

In my young days it was frequently impressed upon me that the best results would always follow if subordinates, however lowly in rank, were given an opportunity to do at least one thing on their own responsibility. This idea has been made a principal feature in the functional organization in the form in which it has been introduced in America. I found that every effort is made to push responsibility down the line, and hence it is that in every grade officials know that there are always certain things in which no further authority than their own judgment is required for the execution of prescribed works. I could not help noticing the spirit of enthusiasm which is thus engendered, and I readily believe that this results in work of so superior an order that the cost of the mistakes which may be made from time to time is paid for many times over by the greatly increased output of work of every official in the great telephone organization of the Bell interest. Such an arrangement also has the merit of developing the most useful attributes of man, and hence there is no lack of the proper material for filling the highest administrative posts.

(To be concluded.)

Nebraska Bell Answers Attorney-General

The Nebraska Telephone company has answered some of the twenty-nine interrogations of Attorney-General Thompson in the injunction suit filed by the attorney-general at the request of so-called independent telephone companies. The suit was filed in the supreme court of Nebraska. The application of the attorney-general includes a request for a receiver and a cancellation of the charter of the Nebraska Telephone company on the ground that it has violated state anti-trust laws. The application for an injunction by the attorney-general asks that the Nebraska company be enjoined from purchasing certain so-called independent companies and from connecting with them. It also asks that the connections already made with certain companies purchased be severed. The supreme court, issuing a temporary writ of injunction, returnable in September, requires the Nebraska company to sever the connections complained of.

Under the law the attorney-general in such cases has power to propound to the defendant a list of questions. He submitted to the Nebraska Telephone company twenty-nine questions. Most of these are answered by the defendant company.

In some instances, particularly in regard to the rates charged from year to year, the company cites the attorney-general to the tariff sheets filed by it from time to time with the state railway commission. As to the contracts made with other companies in Nebraska the Nebraska company files a voluminous showing. It alleges that as the laws of the state changed it changed the form of its contracts with independent companies so that now the contracts are almost uniform. Formerly the Nebraska company did not permit its associate companies to connect with others. Now its contracts do not contain that clause, but the contracts permit of connection with any company so long as the connecting companies do not insist upon sending toll messages over the Nebraska company's lines without the consent of the Nebraska company.

Both the independent telephone association, which asked the attorney-general to file the suit, and the Nebraska company, which is the defendant, have been accused of asking subsidiary and affiliating corporations to write letters and send telegrams to Attorney-General Thompson commending his action in filing the injunction suit or representing to him that the independents are willing to connect with the Nebraska company or any other company that will give the people of the state better and more complete telephone service. Both kinds of telegrams and letters have been received by the attorney-general.

"Question 18.—State whether or not the Nebraska Telephone company is willing to enter into contracts with the Lincoln Telephone and Telegraph company, and other competing companies in the state of Nebraska, providing for the physical connection of the lines and exchanges of said companies and the interchange of business between the same, this to be done without any agreement for the elimination of competition between said companies.

"Answer.—The Nebraska Telephone company is willing to connect with any and every telephone company in the state of Nebraska where such connection means increased business to the Nebraska Telephone company and better facilities to the public. We have never considered that it was possible to have any business relations with the Lincoln Telephone and Telegraph company for that company has made contracts whereby it has bound itself for twenty-five years not to connect with the Nebraska Telephone company. The Nebraska Telephone company would be willing to interchange business with the Lincoln Telephone and Telegraph company on any fair basis."

DEPARTMENT of RAILWAY TELEPHONES

Virginian Railway Dispatching Circuits

By K. W. Endres

A TELEPHONE dispatching circuit extending from Roanoke, Virginia, to Deepwater, West Virginia, has recently been put into operation by the Virginia railway. The extensions of this system contemplated in the near future will cover the whole of the railroad.

The line construction has been installed in first-class shape throughout and is built of copper, weighing 210 pounds to the mile over a distance of 193 miles, with a branch twenty-four miles in length. Transpositions are installed at half-mile intervals, as is usual on all telephone train dispatching circuits.

The dispatcher's office is located at Princeton, West Virginia, ninety-seven miles east from Deepwater. The dispatcher, therefore, has this stretch of line on one side of him and a ninety-six mile stretch east to Roanoke in the other direction, in addition to the branch above mentioned under his supervision.

G. N. MacDougald, Signal Engineer.

On the line from Princeton to Deepwater, including the twenty-four-mile branch, are fifteen selector stations equipped with apparatus supplied by the Western Electric Company, and eighteen stations equipped with telephone sets. On the eastern end of the line, eleven selector stations are installed and nine stations with the telephone alone.

The Virginian railway is a comparatively new road. A number of the way stations on the line are not yet built and section tool houses, used as telephone booths, are taking the place of these temporarily. Conductors and train crews are enabled to get in direct communication with the dispatcher at all times, as the telephone stations are only from three to five miles apart, and in a few instances less than this.

It would be difficult to operate this road by means of the telegraph, and it would be forced into a heavy additional expense in the way of operators and stations solely for the purpose of stationing telegraphers at certain points. With the telephone all this is avoided.

Mr. G. N. MacDougald, signal engineer of the road, solved the problem of having many stations which were not open at all times and some of which did not have operators in them at all, by building a special type of cabinet for mounting his apparatus. This cabinet (Fig. 1) is divided into four parts or sections. The upper portion is equipped with glass doors and contains in one section the desk set box, a protector and two knife switches, the latter to cut off the line east or west. The right hand section contains the selector, a choke coil arrester, and a single knife switch This switch when opened cuts the telephone apparatus off of the line and leaves the line cut straight through. The two lower compartments contain the batteries and desk stand.

The section which contains the desk stand has no back and is arranged so that it is mounted on

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical developments, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

Virginian Railway Dispatching Circuits. By K. W. Endres.....127-128
Wireless in Railway Service. By Dr. Lee DeForrest.....129-130
Dispatching in the Philippines. By Clifford Weldon.....131
Railway Telephone Maintenance. By Wood Wilson.....132-135
Railway Electrical Engineers to Convene.....135

the wall of the station, and a hole is then cut through the wall, leaving a locked door on the outside. Thus when a station operator goes home at night and locks up, any conductor can open this door, reach the telephone set and get into communication with the dispatcher without further trouble. The telephone set switching key, which is used on all dispatching circuits for the purpose of increasing the transmission efficiency of the line has been mounted in conjunction with the telephone desk stand itself on a felt-covered board, so that when the set is handled by people outside the station everything required is available on it. This also is Mr. MacDougald's idea.

The dispatcher's equipment at Princeton was mounted on a board in the usual fashion (Fig. 2) and is enclosed in a glass cabinet, which keeps out dust from the apparatus. A loop has been run from the dispatcher's wire to the superintendent's and the chief dispatcher's desk. This is for the purpose of supervision and enables either of these officials to listen on the dispatching circuit at any time they may so desire. The effect of this feature in telephone train dispatching equipments has been of marked advantage in improving the character of service given on such lines.

In addition a loop has been run to the private branch exchange switchboard and terminates in a jack at this board. In this way it is possible for other parties in the offices of the Virginian Railway to have access to the train wire in cases of emergency, but this wire is at all times under absolute control of the dispatcher on duty.

In planning the installation of this equipment, everything was mounted in the cabinets at the workshops of the company in Norfolk. All apparatus was tested out here previous to installation under exactly the same conditions as would be met with on the line,

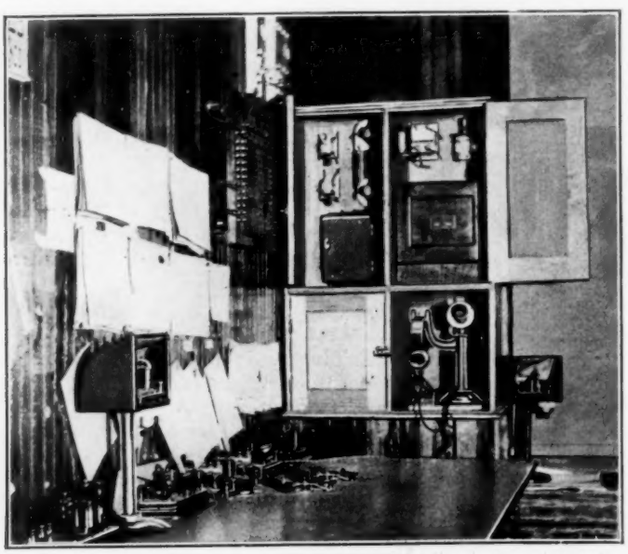


Fig. 1. Way Station Equipment Virginian Railway.

and when everything was in final shape, it was put into a special car and installed in the various offices along the line in a remarkably short time, and at comparatively small expense. All the line wires leading into the office had, of course, previously been installed.

The equipment covers the third and fourth divisions of the Virginian Railway. An order has been placed for some time now for a similar equipment to cover the first and second divisions. This will be installed about September 15, and will complete the equipment of the whole road. These divisions extend from Norfolk to Roanoke and are about two hundred and fifty miles in length. The same size of copper wire will be employed and along this route there will

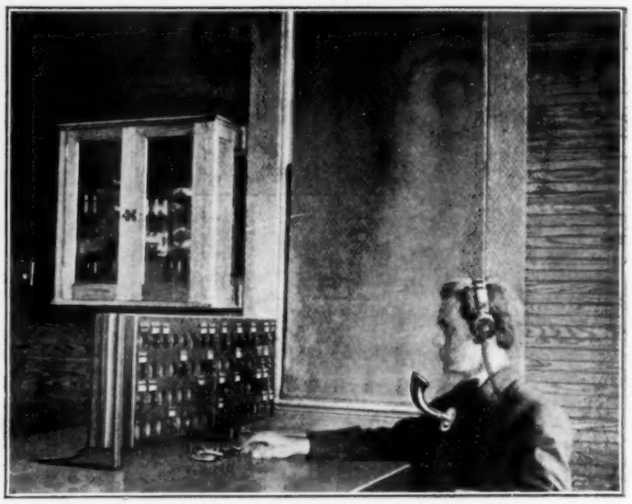


Fig. 2. Virginian Railway Dispatcher.

be thirty-one stations equipped with selectors and twenty-seven with telephones only.

The dispatchers have expressed themselves as being very well pleased with the working of the new telephone system. They had been using the telegraph and a code system telephone. One of them remarked "It is like taking a vacation." The splendid transmission that is being obtained over the circuit is due undoubtedly to the careful manner in which the work has been done, and the high-grade apparatus which is employed, and has added much to the popularity of the telephone with the men who are handling it.

The maintenance man on the line—as a matter of interest—is perfectly able to hear a watch tick over the distance of 157 miles between Fagg, Virginia, and Page, West Virginia.

Mr. MacDougald was supervisor of signals on the Long Island railroad for thirteen years. Later he became signal engineer with the Chicago and Alton Railroad, which position he left to take up his present position with the Virginian in 1906. He has charge of the signals and interlocking department and cares for the maintenance of the telephone and telegraph systems as well. Mr. MacDougald his installed all the automatic signals and a number of interlocking plants on the Virginian railway. He also has charge of all the electrical equipment on the road, covering drawbridges, signal batteries and storage batteries for the Pullman service, with the exception of the power plants.

It is stated a bill has been presented by the Italian Minister for posts and telegraphs which anticipates a total expenditure of $148,000 in the constructions of telephone lines connecting the various towns and districts in Italy, $12,000 of this amount to be applied to the purchase of apparatus for experimental work.

Wireless in Railway Service

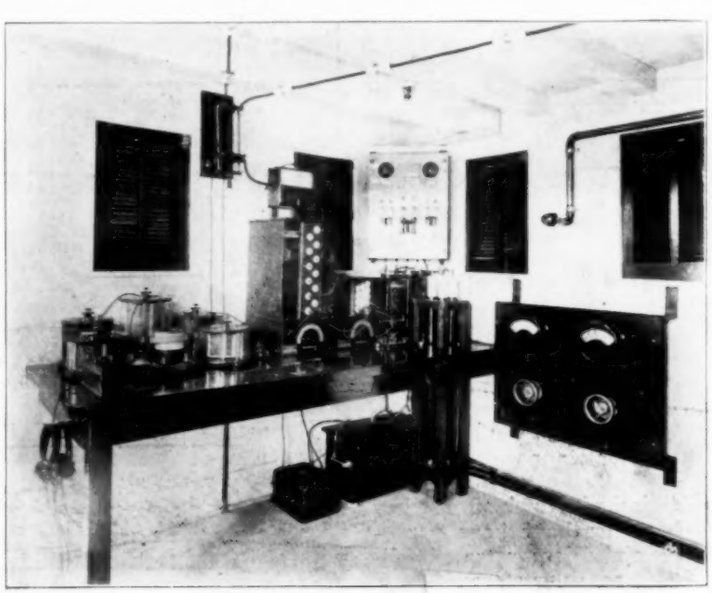
By Dr. Lee De Forrest*

A SUBJECT of this type must necessarily deal largely in futures, yet the demonstrated possibilities of the radio telegraph and telephone and the strict requirements of the railway service are today so well known by the experts in each separate field, that, by conferring and co-operatively working together, it is reasonable to suppose something tangible, and of real value to both may rapidly result. The possibility of telegraphing wirelessly to moving trains over considerable distances by means of the old-fashioned spark telegraph, was, I believe first demonstrated in 1905 over the Chicago and Alton railroad out of Chicago and St. Louis.

Thanks to the enlightened interest which the officials of that road took in my proposals, I was allowed the privilege of experimenting on the fast daylight express between St. Louis and Chicago. Two horizontal antenna wires were first run on insulators along the top of the train and connected to a receiving instrument installed in the parlor compartment of that coach. Earth connection was made to the trucks, the fifteen kilowatt station at East St. Louis, about two miles from the track side, and the ten kilowatt station at Chicago, a quarter mile from the rails, were used as transmitters. No attempt was made at that time to transmit messages from the train. But unfavorably situated as both these stations were, so far from the tracks, messages were clearly received on the flying train when thirty to thirty-five miles from these stations.

Subsequent experiments at New Haven, Conn., and Toronto, Canada, demonstrated the correctness of my view, that the track rail system, including the mass of telegraph or telephone wires along the right of way served not only as a conducting zone or wave chute along which the electric waves preferred to travel; but also acted as a net to catch waves coming transversely and obliquely towards the right of way, and then distributing in both directions along the track a surprisingly large amount of electric energy.

On account of this directive action of the telegraph wires it is easy to pick up strong wireless telegraph signals by a wave detector connected to a short horizontal wire stretched parallel and near to the telegraph wires, and at a surprisingly large distance from the wireless station.



Two-Kilowatt Wireless Telephone Station, De Forrest System.

Now, given this phenomena, it is easy to understand how a track side wireless station, using a horizontal antenna, wire say 100 feet long fastened to two or three telegraph poles, can communicate with another trackside station similarly arranged, and distant twenty or even more miles from the first.

Obviously one or both of these stations can be located on board a train, and in such case the horizontal antenna wire can, as I have demonstrated, be run inside the cars, of heavily insulated wire, parallel to the bell cord. This is, of course, providing that the cars are of wood and not of steel. In the latter case wires would need be supported on insulators a few inches above or at one side of the roof of the cars.

By this arrangement it would be a comparatively simple matter to telegraph regularly to and from express trains, over a distance of say forty miles (twenty miles on each side of the track side station). However, the commercial applications of such a wireless telegraph service would be generally confined to a few limited trains, where for the benefit of traveling business men, a news or stock report service could be made a feature. The expense of carrying a telegraph operator on board more than the cost of the equipment entailed, would greatly limit such application.

With the radio (or wireless) telephone, however, the case becomes very different, so different in fact that it is my firm belief that ere many years the telephoning to moving trains, and especially to locomotives, will become a very common, or well nigh universal adjunct to our elaborate railroad safety appliances.

For such a purpose long distance of communication will be quite unnecessary, in fact, undesirable. Consider a railroad system equipped with the block system, with signal stations or towers at mile intervals; a small wireless telephone transmitter capable of half-mile communication and utilizing the inductive or "wave-chute" action of the existing telegraph wires would cost little to install, little to operate, and be so simple as to add practically nothing to the training of the signal operator. A horizontal antenna wire would be extended to the first or second telegraph pole stretched three feet below the lowest telegraph wire, the earth connections would be direct to the track rails. On the locomotive or over the locomotive and the first coach will extend an insulated wire as easily coupled up when making up the train as is the air brake at present. In

*Read at Los Angeles convention.

the cab a small box is fastened containing a tuning coil and a simple crystal wave detector; connected to this is a single head telephone receiver with head band attached, or a telephone receiver with rubber air pad is fastened to a short arm, at a point where the engineer can easily rest his ear against it. The body of the locomotive, of course, supplies the earth connection.

This system would enable the signal man to talk direct to the engineer for a period of one to four minutes, and add immensely to the probability that he will perceive the proper signal, or enable him to receive orders or information which the semaphore cannot possibly communicate. The engineer could not, of course, reply, except to O. K. by whistle.

It would appear that by this appliance it will be generally quite unnecessary for a train to stop merely to receive dispatcher's orders. What value this saving of time of hundreds of trains would aggregate to the railroads in a year, I have no means of estimating. Surely it would total very large figures.

Arrangements have already been made with the New York Central for carrying out a series of experiments in telephoning thus to moving trains, from a track side station at Spuyten Duyvil, on the Hudson; and I expect soon to be able to publish some very interesting results.

A short range wireless telephone transmitter for such service as I have just described is operated from a few cells of Edison-Lalande battery, and the entire transmitting outfit will occupy less than three cubic feet of space.

Now consider the application of such wireless telephone instruments to freight train service, on roads like the Santa Fe, for example, without block signal stations at short intervals.

It frequently happens that a train awaits on a siding for long periods the passing of another which has been delayed by accident or other cause and with no means whereby the train crew can be notified to proceed. A portable telephone set installed in the caboose could be quickly brought into action to call up the nearest dispatch station.

To facilitate this work a length of flexible antenna wire can be very quickly spiked up on two or three telegraph poles as high as a man can reach, parallel to the telegraph wires or directly connected to a wire through a small condenser, the capacity of which is too small to allow any detrimental grounding of the wires. This "emergency antenna" can be strung up and taken down again in two minutes' time. Such means for getting quick communication with stalled freights will mean an immense saving in costly delays to freight and to all trains affected by the tie-up, to say nothing of loss in wages to idle train crews, this latter item where the sixteen-hour law is operative.

I believe that the railroads will soon see this method demonstrated, and be quick to admit the economy to them of equipping every caboose or a car on every accommodation train with such portable wireless telephone transmitting and receiving sets, whether or not the locomotive carry the receiving apparatus, which I have already described.

Ideas as to the possibilities of our land wireless telegraph for commercial purposes have been generally founded on the all too plainly demonstrated failures and shortcomings of the spark systems. Such service is limited to relatively short distances over land by daylight, on account of the sad inefficiency of the spark wireless transmitter. The best of the spark systems can radiate generally less than ten or twelve per cent of the energy taken from the dynamo, then the trains of electric waves which the spark transmitter sends out are "strongly damped" as we say—*i. e.*, rapidly tail down to zero. Sharp tuning at the receiving station to cut out interference from other stations or from atmospheric causes is really quite impossible when one has to work with these strongly-damped waves from a spark transmitter.

Hence, in addition to the short ranges necessitated, the spark system is not, and cannot be made reliable and "interference-proof." Such means, therefore, as supplementing the wire service of a railroad at times of emergency as when long stretches of wire are mowed down by sleet and wind storms is quite impracticable because so altogether unreliable.

During the last year, however, a new epoch in wireless telegraphy has been entered, marked by the Radio Telephone Company's new sparkless, wireless telegraph system. This "Radio-tone" transmitter (as it is called) is sparkless and noiseless, in place of the noisy, crude and inefficient old spark gap, it employs a silent discharge from the antenna wires and emits trains of waves which are very little damped, *i. e.* which tail down to zero very slowly.

Moreover, we can now radiate fifty to seventy-five per cent of the energy derived from the alternating current dynamo instead of the ten to twelve per cent of the spark system. This means that ranges two or four times greater than those given by the old spark method are possible and that wireless interference from natural or artificial sources can be completely and successfully eliminated.

As proof of my statement note the work daily carried on between our New York and Philadelphia and Washington stations where, in each case, a spark station of the United Wireless Company is operating within one to nine city blocks from our own, yet an hourly commercial wireless service is continually maintained by our company.

I have here a photograph taken last week in San Francisco of a two kilowatt installation of the sparkless radio tone system on board the United States army transport "Buford." The first day this apparatus was put in operation the "Buford," lying at her wharf in San Francisco, communicated in bright daylight with a naval station at Point Aguillos, nearly 300 miles south, a new daylight record on the coast.

A number of other army transports are now being equipped with this system, replacing the spark apparatus.

The art has now actually reached the stage where we can begin to handle overland business in competition with wire lines.

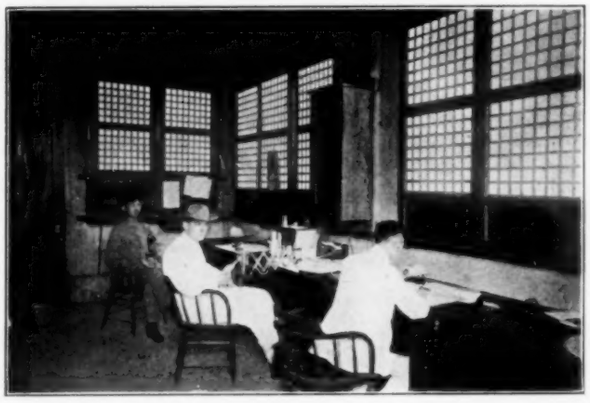
Therefore, the sparkless, wireless telegraph possesses immediate interest to railroad telegraphers as ready means for communicating over long distances between division headquarters, especially at times of emergency when storms and washouts have cut wide gaps in the wire system.

I foresee this use of the wireless telegraph coupled with short range telephone safety signaling and emergency service as occupying a very extensive field of usefulness to railroads and the traveling public.

Dispatching in the Philippines

By Clifford Weldon

SO gradually and so quietly has the telephone entered the railroading field that few are aware to what extent it has been adopted as a means of communication in this important industry, and that it bids fair to become a dominant factor in the handling of traffic. The most extensive use of the telephone in this



Substation on the Philippine Railway, Iloilo, P. I.

line is for the transmission of train orders, but it is also used to a considerable extent in connection with the operation of manual block systems. Of the 131,014 miles of railroad in operation in the United States, 26,344 are now operated by telephone, which leaves a large field yet to be supplied; and now that the advantages of the telephone as a means of train dispatching have been demonstrated, it is being installed as rapidly as practicable.

Not only is this true in our own country, but it is being extended to our newly acquired possessions.

Section House on the Philippine Railway.

For example, in the construction of a new railroad in Panay Island, one of the Philippines, telephones for train dispatching were installed along with the other equipment.

There being no telegraph or electric light wires to interfere, the Philippine railroad has an advantage over the American road in that its telephones require but one wire. The earth currents are so nearly imperceptible as to make transposition unnecessary, for this grounded line works as satisfactorily as a well transposed all-metallic line. The dispatcher's equipment consists of a call box and Sandwich selectors located at the sub-stations.

The heaviest traffic on this special line consists of passenger travel as the island is not sufficiently developed to require a very extensive freight service and the natives are not educated up to the point of utilizing this service for transporting whatever commodities they do have. As in all tropical countries, time is no object to them, and this, together with the enervating effect of the climate, makes them willing to plod along in the same old way, their usual means of transportation being the ox cart.

The villages in this section are of the most primitive character, being native huts, located on stilts about three feet from the ground and having thatched roofs. In some villages there is one exception to this rule,

Dispatcher's Office, Philippine Railway, Iloilo, P. I.

that being the railway depot, which also serves as the agent's residence. In design it resembles the American bungalow. Owing to the extreme heat, instead of glass the windows consist of small squares of pearl, which are intended to keep out the hot sun while diffusing enough light to work by. In order to be able to look out it is necessary to push aside the entire window, which would seem rather odd to an American dispatcher, who is usually located so as to be able to see the track from his desk.

The service is proving very satisfactory and when the extension now in progress is completed this division will have a total of eighty miles, with sixteen stations. As English is spoken quite extensively, the natives are eligible as operators. The dispatcher is located at Iloilo, which is also division headquarters.

It is stated that the Southern Belle Express, operated between London and Brighton by the Brighton Railway Company, will be equipped with the Kramer system for telephoning from a moving train.

Railway Telephone Maintenance

By Wood Wilson*

WITH the commercial telephone companies the greatest factor in maintenance is cost; with us, efficiency should be the first consideration.

Starting with a magneto telephone the important item is the battery. Within the last ten years the dry cell has been improved in quality and reduced in cost, until it has entirely supplanted the Fuller cell, which was almost universally used previous to that time. The essential features of a dry cell for telephone use are slow deterioration when not in service, the ability to recuperate rapidly periods of use, and long life in service.

An ammeter, for measuring dry cells, should have a resistance about equal to that of the primary circuit of a telephone. Those commonly used have a very low resistance, practically short circuiting the cell under test, which greatly injures it in a few seconds. In measuring the current of a cell a firm contact should be made on the brass terminal, as the carbon offers a high resistance, making a material difference in the reading.

While good results are obtained by connecting batteries in parallel for use with low resistance transmitters the best results are obtained by using a high resistance transmitter and connecting the batteries in series, three cells being commonly used. The cells should have a moisture proof covering over the zinc, and should be placed in or as near the telephone as possible and not less than a No. 19 gauge wire should lead to the transmitter and induction coil. Batteries placed in cellars or other damp places are not only short lived, but as they are connected through the switch hook and secondary to the line, they cause leakage and an unbalanced line. On the other hand they should be kept away from radiators or registers, as they are worthless when dried out.

No more dry cells should be carried in stock than are actually needed, as they should be used within one month of the date of manufacture. In coupling cells together the wire should be thoroughly scraped and looped around the binding post to the right, and the nut tightened with pliers, care being taken not to cut the wire by tightening the nut too much. Very good connectors may be made by saving the tips of desk cords and soldering a short piece of wire to them, as they give a large surface contact and are not injured by tightening. Care should be taken that no zinc binding posts shall touch that of another cell when placed in the telephone.

The hinges of a telephone should not be used as part of a primary circuit, as the springs deteriorate very rapidly, around a railroad, causing opens or high resistance. Where the transmitter is mounted on a door flexible cords should lead around the hinges. Tinsel telephone cords are very fragile, and their life is greatly lengthened by using telephones and receivers with internal binding posts which prevent their breaking at the tip. They should always be kept dry, as when moist they are noisy and also give a "permanent" signal at common battery exchanges. In renewing cords care should be used to see that they are not reversed. It is surprising to find that some of our most careful men make so many errors in connecting the cords of desk telephones. One way to eliminate this trouble would be to have three styles of cord tips on a triple cord and have terminals that hold only the proper cord tip.

Where it is necessary for a desk extension cord to have a cord weight attached there should be a hard rubber bushing in the hole in the desk to prevent wear. The use of cord weights, however, on this class of cord is not advisable, as the short bending soon causes noise from broken tinsel. The various types of folding and swinging desk sets reduce the cost of cord maintenance very considerably.

The switch hook of a modern telephone requires very little attention, unless it is bent out of shape or in very dusty places. Dust sometimes settles on the top of hard rubber between springs and when strong ringing currents are used, causes an arc which carbonizes the rubber, causing a short circuit. Dust between the platinum contacts can be removed by depressing the switch hook and placing card board on paper between contacts, then raising the hook and withdrawing the paper.

The adjustment of polarized bells is a source of much trouble to some repairmen. No adjustment has been found that will meet all conditions, as a bell at the distant end of a party line necessarily receives less current than a near one, and must have the armature set closer to the core than others. The armature should be so adjusted that the clapper rod will not touch the sides of the hole through which it passes. The gongs should then be moved until they come as close to the clapper as possible without touching it when the armature is resting against the core. This adjustment will allow undamped vibrations of the gongs and the recoil of the clapper will tend to pull the armature away from the coil and strengthen the next stroke. Iron filings should be removed by passing a piece of card board or blotting paper between armature and coils, as they cause the armature to stick by forming a magnetic bridge around the brass pin, which is placed in the armature to prevent sticking. The armature should have as little end shake as possible without binding. The permanent magnets often become demagnetized by abnormal currents and should be replaced or re-magnetized by holding them against the field of a motor or dynamo.

A good hand generator requires very little attention, except a drop or two of oil on the bearings when they become dry. An excess of oil is liable to cause a short circuit by creeping in to the armature winding or by softening the hard rubber of the commutator. The magnets rarely lose their strength and it hardly pays to re-magnetize them, unless one has a special helix and suitable current.

The receiver magnet should be tested for strength by touching edge of the diaphragm across the poles, as it frequently becomes weakened by strong ringing

*Address to Pennsylvania Railroad employes.

current passing through it. All dust and especially iron and steel filings should be removed from it at each inspection. When a telephone is to be used both on magneto and common battery lines the receiver cord should be reversed if the common battery exchange cannot be heard distinctly, and if used on more than one common battery line, the lines should all be poled alike.

The office wiring, if properly installed, gives very little trouble. Where floor outlets are used they should be watertight, and should be under the desk where a mop will not touch them. Where wires pass down walls through the floor hard rubber tubing should extend from the top of the mop board through the floor. Where joints are necessary they should be soldered. No joints should be pulled in floor conduit where they cannot be inspected. It is better to pull in a new piece and use the short pieces for other work.

The average protector on the market has entirely too many joints. The ideal protector should have but four joints in the talking circuit. These should be formed by four strong screws which will bring the wire and fuse ends under the same screw. Very few repairmen carry siutable wrenches for the nuts on protectors, and in using pliers the lock nut is often tightened and the wire may be loose.

Nothing smaller than No. 14 B. & S. twist should be used for subscribers' loops. In splicing twisted pair, a Western Union joint should be made and well soldered. It should then be wrapped with rubber tape, then slightly warmed and covered with friction tape. The splices in both sides of a pair should not fall together, as any leakage across joints in wet weather not only causes noise, but soon eats wires off on common battery lines. In dead-ending twisted pair on insulators, do not make turns short around the wire, but let them extend out in a spiral form, covering several inches from the insulator, as wire may be taken down and used again if no short kinks have been made in it. Twisted pairs should not be used for overhead railroad crossings, where open copper will do, as the vibrations from the exhaust cause intermittent opens which are very hard to locate.

Terminal boxes should be waterproof and as nearly airtight as possible, as the sulphur from engines soon destroys the arresters. It is well in case of large terminals to have two sets of doors and pack the bottom of the box with loose asbestos, where cables and wires pass through. A wire screen should cover the bottom of the box outside to keep sparrows from nesting in them, or from carrying away the asbestos packing. Sparrows' nests are often ignited by lightning, thus destroying the terminal. These birds have also been known to strip the wires of all insulation. All lines entering a cable terminal should pass through a pair of fuses and have carbon or copper block cut-outs on the cable end of the fuse. Frequent tests of these should be made to see that they are well grounded.

To be able to locate and clear cable troubles promptly, complete records should be kept, showing distances between all manholes; also span measurements of all aerial cables and distances between terminals. A chart should be kept, showing each conductor, its gauge and terminals and switchboard number, if in use.

The most frequent cause of trouble in cables is moisture, which is indicated by "permanent" signals at common battery exchanges or cross-talk at magneto exchanges. Prompt action will usually allow one to locate trouble by means of a Wheatstone bridge before all the conductors become wet, as otherwise it is necessary to string an outside wire for use in the Murray or Varley loop methods. Several types of trouble detectors are in use, for which good results are claimed. They consist of an apparatus for sending tone to the fault and a detector with a head receiver to be carried along in close proximity to the cable; the tone being heard until the fault is reached. Several other methods may be used when proper facilities are not at hand, such as removing all grounds from the sheath of a cable and connecting a strong battery between the sheath and grounded conductors, then advance along the cable toward the supposed fault, holding a needle in each hand connected to a head receiver or milli-ammeter. Place the needles on the sheath as far apart as you can reach and a slight click will be heard in the receiver, or a deflection noted on the milliammeter until the fault is reached.

When water in a cable becomes frozen and conductors show clear a torch carried along the sheath will thaw it out and cause the line lamps to burn when the fault is reached. Having located the moisture, if in underground, a piece of cable must be pulled in a vacant duct and the old cable cut over to the new cable at manholes on each side of the fault. If an aerial cable, the sheath should be cut off from a little shorter length than the sleeve to be used, and the core boiled out with paraffine until all traces of moisture are removed. If the moisture has run back too far to be drawn out in this way it may be necessary to cut a new piece of dry core in. If the cable has been wet for any length of time a new piece is best, as the insulating qualities of the paper are spoiled by the decomposed copper deposited on it by electrolytic action.

Frequent readings should be taken on underground cables for current which would cause electrolysis. If the current flows from the surrounding earth to the cable at all points, no damage will occur, but if in the opposite direction the cable should be bonded to the negative side of the street railway or other circuit from which the leakage comes. Insulating sleeves placed in the sheath of cable leaving steel structures will often prevent the flow of the current, or for short lengths of underground cable a good plan is to place it in iron conduit which should be properly drained; then electrolytic action will take place on the conduit instead of the cable.

As the electrolytic currents vary with the load carried on the distributing circuit a good precaution is to have a pair of insulated wires leading from each manhole to the terminal room, having one side connected to earth and the other to the sheath of the manhole and placing a recording voltmeter on a circuit for a week at a time, thus making a chart of the current for all days of the week.

If heat coils are used they should not have inductive windings, as the impedance causes serious transmission losses, in addition to loss from the resistance of the coil. Much noise is caused on trunk lines by poor contacts between ends of heat coils and plate springs, which become oxidized in a short time.

Main and intermediate frames should be located in a dry place, as in damp basements the jumpers are soon eaten off by electrolytic action, and much cross-

talk also results. Dust should be removed daily from all terminal strips, especially horizontal ones, by use of a moulders' bellows or vacuum cleaner. Nothing but rubber covered, flameproof, braided, tinned, copper wire should be used for jumpers.

Not one man in ten makes a good soldered joint. In soldering copper wire nothing but resin should be used as a flux. All other soldering preparations for copper wire are for lazy men; for if the copper is cleaned and is covered by a film of resin, the solder will always flow. Most soldering preparations clean the copper by chemical action when heat is applied. This chemical action continues to some extent until the terminal or wire is destroyed. After the terminal and wire are cleaned and in place hold a piece of resin core solder on the joint and touch the point of the soldering copper to it. This will allow the resin to flow into the joint before the solder, thus preventing oxidizing of the copper.

The handle of a soldering copper should be held high enough to allow solder to flow to the point. When solder flows remove the soldering copper quickly. Never use sal-ammoniac to tin a soldering copper, as it will soon eat pits into it and make frequent dressing necessary. If it should need dressing use a file to shape it up, then heat and rub on a piece of sandpaper, at the same time applying resin core solder.

All trunk lines should pass from the main frame to a patch or test panel which should contain four jacks for each line. These jacks should have platinum contacts and be spaced to receive a double plug for patching or testing. The line side jacks should be placed one above the other, and the switchboard jacks to the right of them. These jacks are strapped together in such a way that a double plug placed on the line side will connect with the line and leave the switchboard side open, and vice versa. Patch cords should be provided, which will allow any line to be cross connected to any other line on the panel.

Composite sets and simplex coils should terminate on jacks in the same manner. Several "Morse" wires should lead from the telegraph office to the panel, so that any kind of circuit can be plugged on any line, or in case of storms a telephone line can be split up into Morse lines.

In locating patch panels at various points on long lines care should be used to place them at points where local lines will be available for patching around breaks in the through lines. Heavy gage wire should be used to lead into panels from through trunks, to keep the resistance as low as possible. Where one man looks after the patch panel and test table it is well to have them combined.

The test table should be equipped with a 100,000 ohm voltmeter, having a 50-volt scale. A set of dry cells, sufficient to give 50 volts, should be grounded at one terminal and the other terminal carried through a series of switches, grouped in such a way that the battery will pass through the voltmeter and out on a cord terminating in a double plug which will fit the jacks on the patch panel. One switch should be arranged to reverse the line, another to ground the opposite side of line for continuity tests, another to cut off battery when measuring foreign current, another to reverse the voltmeter when foreign current is of the opposite polarity, another to throw a low resistance shunt around voltmeter when measuring foreign currents which may be of a higher voltage than the voltmeter. Keys should also be provided to connect a telephone to the cord and to throw battery out on the line, for testing common battery telephones.

Ringing keys should be wired in circuit, one each for metallic ringing, tip to ground, ring to ground and pulsating positive and negative where selective systems are used. A key should be mounted which will cut in an artificial 20-mile cable for transmission testing. This artificial cable should consist of resistances and capacities equivalent to 20 miles of low capacity, No. 19 B. & S. gage cable.

Two test lines should lead from jacks on the test table to test cords on telephone switchboards. Battery should be supplied to the sleeve of these cords through lamps on the test table. This battery will serve to operate the cut-off relay and will burn the lamp as an indication that a line is under test.

Much better transmission can be secured if the storage batteries have an ample capacity, as the voltage will hold up better on the peak of the load. Manufacturers' instruction for care of storage battery must be strictly adhered to if the best results are to be obtained. The battery terminals should be well soldered in addition to bolting and very large conductors should lead to bus bars by the shortest route possible, and all switches should be of a capacity several times greater than the current to be carried, as a fraction of an ohm in the battery circuit will cause cross-talk.

The commutators of motor generator sets should be kept thoroughly cleaned and polished, as noisy lines will result, especially on loaded trunks, if they are rough. If carbon brushes become rough the machine should be stopped and a strip of sandpaper drawn under brushes with the smooth side against the commutator, thus grinding the carbon to conform to the commutator. Vaseline or paraffine can be used under brushes, but the results are not as good as obtained from some of the compounds on the market. Brushes should always be set diametrically opposite one another, and the yoke shifted until the maximum current output is reached and no sparking results.

As switchboard maintenance would form a subject for an additional paper, only a few of the most important items are here mentioned. Daily tests of all switchboard cords should be made by plugging in a noisy line and moving the cord just back of the plug, when any cut-off can be detected by the interruption of the noise. In a small exchange cords can be cut off and plug reset without removing them, but in a large office they should be removed for repairs. Cord weights should never be allowed to touch the floor, as the noise is very annoying to operators. In looping up slack in a long cord the loops should be made as close to the end as possible in order that the cord will reach the farthest multiples. Series jacks are very objectionable in a large board for railroad use, as much dust gets in the contacts, causing open or unbalanced lines. When switchboard plugs have been out of service they should be buffed with jeweler's rouge to remove oxidizing, as it forms a very high insulation.

No. 14 twist should lead from arresters in cable terminals through enameled iron bridle rings on bottoms of cross-arms to aerial copper lines; the latter should be dead-ended with a half sleeve and enough end left, to give space to solder the jumper, which should have only one or two turns to the inch of line wire, as closely wrapped wire does not make a good

contact, and is ruptured by short bends. If construction men do not carry a soldering outfit they should use test joints, which should be removed when soldering is done. Too little attention is paid to joints in trunk lines, as we spend thousands of dollars for heavy gage copper to give a low resistance line when a better line might be built at half the cost by having perfect joints. Frequent resistance measurements should be made on all trunk lines and records kept, together with temperatures, so that any unusual resistance can be noted and removed. These records will also be useful in locating trouble by the Varley loop method.

Railway Electrical Engineers to Convene

The second annual convention of the Association of Railway Electrical Engineers will be held in the La Salle hotel, Chicago, September 27, 28, 29 and 30 inclusive. The Railway Electric Supply Manufacturers' Association has in charge the arrangements for this convention and is doing what it can to insure its success. Exhibits of the various products used by steam railroads will be made by most of the prominent electrical manufacturers who cater to this trade. This exhibit will be located on the sixth floor of the hotel, which has been set aside for this purpose. The sessions of the convention will be held in the hall adjoining the exhibit room.

Not only have the business features of the convention been well provided for, but the entertainment committee is making ample preparation to make the stay of its guests a pleasant as well as a profitable one. This part of the program has been prepared with special reference to the welfare and enjoyment of the ladies who may be in attendance and will consist of a ball, informal reception, automobiles rides through the parks and other places of interest, and theater parties.

The officers of the association are as follows: President, E. M. Cutting, electrical engineer, Southern Pacific Railroad; first vice-president, J. R. Sloan, electrical engineer, Pennsylvania Railroad; second vice-president, F. R. Frost, electrical engineer, Santa Fe Railroad Company; secretary, George B. Colegrove, chief electrician, Illinois Central Railroad.

The following constitute the committee of the association: Exhibit, W. E. Ballentine, Willard Storage Battery Company; entertainment, W. H. Glatt, New York Leather Belting Company; auditing, J. M. Lorenz, Central Electric Company; finance, A. C. Moore, Safety Car Light and Heat Company; publicity, Edward Wray, Railway Electrical Engineer; membership, J. N. Schilling, Westinghouse Electric Manufacturing Company. George H. Porter, of the Western Electric Company, is chairman.

The United States Electric Company, manufacturer of the well-known Gill selector, used extensively on the railroads for telephone train dispatching, announces that it has recently made arrangements with the Kellogg Switchboard and Supply Company of Chicago, manufacturer of high-grade telephone apparatus, to act as its exclusive agents in the sale of telephone equipments to railroads. This combination will, no doubt, result in the production of a very superior grade of selector and telephone equipment especially adapted for railway services.

Of Interest to the Trade

Kalispell, Montana, New Common Battery Exchange

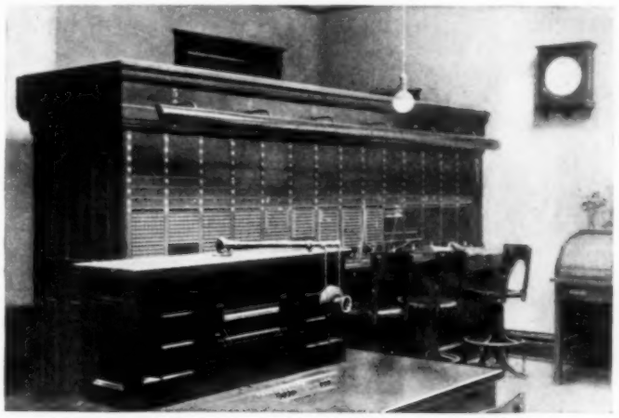
The installation of a complete new common battery exchange equipment in the city of Kalispell, Montana, has recently been completed by the Western Electric company, and an up-to-date and efficient telephone system is now provided for the subscribers of the Northern Idaho and Montana Power company in that city.

The installation comprises a subscriber's switchboard, wire chief's desk and chief operator's desk, toll equipment for completing long distance connections, power plant for supplying energy to the system and outside construction, including poles, lead cable, wire and subscribers' sets.

The subscriber's board consists of two sections of standard Western Electric equipment, having seven panels and three operators per section. Four operator's positions are used for taking care of the local subscribers' service, while one operator handles toll and rural calls. The switchboard is capable of accommodating 4,600 subscribers' lines, fifty rural lines and toll and pay station lines.

The exterior of the switchboard, which is constructed of Brazilian mahogany, highly polished, makes it an ornament in the remodeled telephone quarters of the Northern Idaho and Montana Power company.

The wood work of the chief operator's desk is made to match that of the subscriber's switchboard. This desk is provided with lines for connection to the switchboard for properly supervising the work of the operators, receiving complaints from subscribers and



Operating Room, Kalispell, Montana.

giving the operator means for determining the cause of complaint by listening on the circuit of any subscriber or operator without their knowledge, and ascertaining the deportment of both while conversing. Trunk circuits to other parts of the telephone system

are provided, enabling the chief operator to secure immediate connection with the manager's department, the wire chief's desk, etc.

Testing circuits and plugging up lines sufficient to permit trouble to be rapidly cleared up have been arranged on the wire chief's desk. All tests can be made with accuracy, ease and dispatch. Trunk lines connect the various parts of the telephone system with this desk, bringing the wire chief into immediate touch with any part of the system.

In the terminal room the arrangement of the many wires has been made so as to reduce to a minimum the possibility of trouble and to facilitate the clearing up of any trouble.

The power plant consists of a twenty-four-volt storage battery for the local supply and forty-eight-volt storage batteries for the toll supply, with a gas engine-driven charging generator for supplying energy to the batteries. This charging generator is one of a special construction, designed for the charging of storage batteries without introducing magnetic and commutating noises on the telephone circuits. In the event of any accident to the storage batteries the exchange may be supplied with power direct from the machine without any noise interfering with transmission.

The storage battery has sufficient capacity to carry the exchange a number of hours in case anything should happen to disable this generator. Duplicate ringing outfits were furnished for the telephone system and connected to separate circuits.

In laying out this telephone equipment extra precautions were taken because of the network of wires carrying electric current of both high and low potentials in and around Kalispell. It is necessary to protect the apparatus, subscribers and employes against these currents as well as against lightning. A wall type frame is furnished, and on this the subscribers' lines terminate, continuing through the cable to the main distributing frame. Entering the main distributing frame on the horizontal side, the lines are carried through the frame by means of jumper wires to the switchboard or arrester side, where they are further protected from sneak currents and heavy lightning discharges by means of heat coils and lightning arresters. This gives absolute protection against any outside disturbing currents, whether of large or small proportion or whether static or dynamic in character.

Universal Test Clip in Demand

R. S. Mueller & Company reports a very flattering demand for the Universal test clip it manufactures. Although this device has been on the market only a few months, it has already been adopted by a number of the largest Bell and independent plants in the country. The device is also used by leading electrical manufacturers and by makers of insulated wire on all shop testing devices where a ready means of making a test connection is required.

Although the makers put the test clip on the market primarily as a telephone tool they have been agreeably surprised at the number of unthought-of applications of the clip which have come to light. Electric light companies use the clip on the cords of magnetos and with voltmeters when making pressure tests. They are also being used to snap over the lugs of ignition cells to carry current to an automobile exploring lamp. They have been used to snap over lugs of telephone storage batteries to take individual cell voltage readings and are particularly applicable for this purpose as the jaws have a spread of ⅝ of an inch. They are being used by railroad signal engineers and supervisors for general testing purposes.

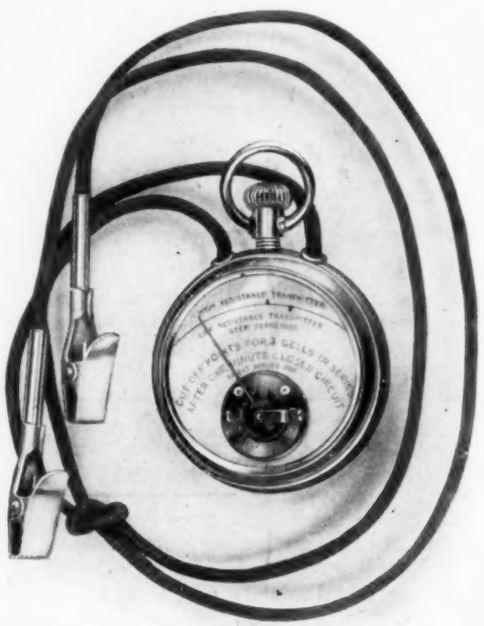
In the smaller towns the telephone and electric light companies are often called upon to charge ignition cells for automobile owners. The clips have been used in this work where a number of cells are charged in series by fitting a number of 15-inch pieces of flexible wire with clips on each end for making quick connections between the cells.

One ingenious customer, apparently working with higher voltage, insulated the clip by slipping on an ordinary nursing nipple, making a hole in the small end through which to lead the cord and bringing the open end of the nipple up over the shoulder of the clip. The rubber in no way interferes with the action of the clip and serves to insulate it effectively.

The company has recently moved into larger quarters, and is now located at 423 to 425 High avenue, Cleveland, Ohio.

Western Electric Watch-Case Battery Gauge

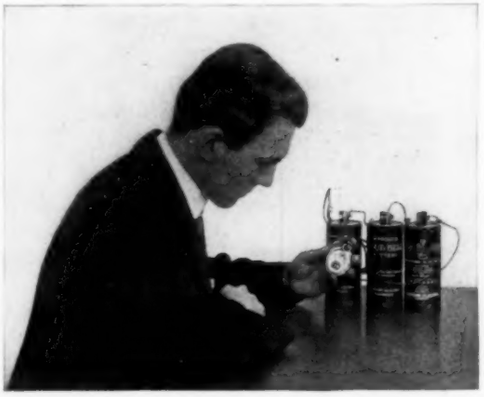
The No. 30 battery gauge, recently developed and placed on the market by the Western Electric Company, is a compact instrument for measuring accurately and efficiently the strength of telephone dry batteries used in connection with Western Electric transmitters. It is designed for connection to three cells in series, duplicating conditions of the local battery subscribers' set. It contains apparatus for gauging high and low resistance transmitters.



The New Western Electric Battery Gauge.

The No. 30 gauge is in watch-case form, and the views which are shown herewith demonstrate the convenience of the arrangement. It contains no scale, but is designed merely to show the point at which

batteries should be put out of service. For the high resistance transmitter a mark above the arc on the face of the gauge is used to denote the cut-off point. This means that current from the three cells is being sent through 20 ohms resistance. The cut-off point is 140 milliamperes, a point which conforms with the best telephone practice.



Using the Battery Gauge.

When the stem of the watch-case is depressed, 15 ohms resistance are removed, leaving only five. This produces the conditions of the low resistance transmitter, and the cut-off point, which is indicated below the arc, is 420 milliamperes.

Book Reviews

ELECTRIC WIRING, by Joseph G. Branch, is another of that prolific writer's practical guides for the worker in electrical fields. The conversational, or question-and-answer style, which seems quite a favorite of this author, is used; and no doubt he is right in assuming that those who need such instruction can assimilate it more readily in this form. The treatment covers the principles governing the art of wiring, including both direct and alternating current work, and of course follows the requirements of the National Board of Fire Underwriters. The work is very thorough, covering all kinds of wiring from the simplest circuits to high tension and wireless systems. It is well illustrated.

Cloth, 300 pages. Published by the Branch Publishing Company, Chicago. Price, $2.

THE PRACTICAL TELEPHONE BOOK, by Joseph Poole, is issued in its fourth edition, after a thorough revision and the addition of some 70 pages of new matter. Some of the subjects which have been treated more extensively in the present volume are the following: Submarine Telephone Cables, Later Post Office Exchange Practice, Development Studies, Wireless Telephony and Automatic Exchanges. Some very valuable and useful information has also been added to the appendix, and the book also contains over fifty additional illustrations. Mr. Poole's book is very comprehensive, covering all the branches of telephone work from the most elementary to the most complicated and is one which every telephone man should include in his library.

Cloth, 600 pages, published by the MacMillan Company, New York. Price, $1.75.

C-A-Wood-Preserver Active

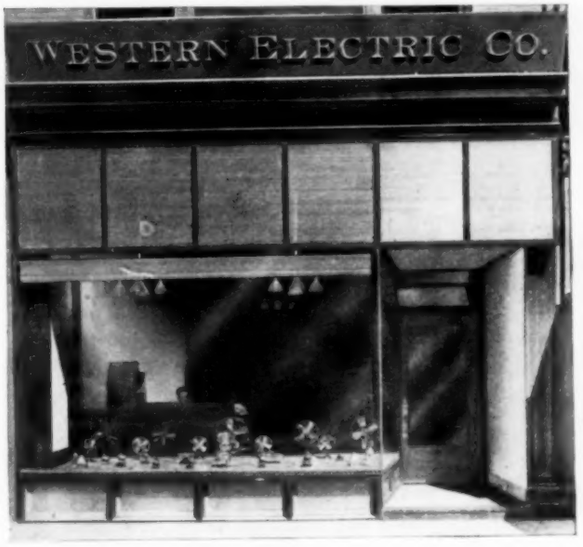
The C-A-Wood-Preserver Company, with headquarters in Austin, Texas, has recently opened an office in Indianapolis, under the charge of F. D. Rushing. It is located in the Y. M. C. A. building. The company has also added Chicago to its distributing points, which will facilitate making quick shipments in the middle west.

The C-A-Wood-Preserver Company has issued a loose-leaf catalogue entitled "Wood Preservation," which contains a number of interesting letters from users of the C-A process, as well as considerable general information and a number of interesting illustrations. The company is also sending out a little sample piece of wood treated with C-A wood preserver and wrapped in an attractive circular.

New Western Electric Headquarters in Milwaukee

The new Western Electric headquarters in Milwaukee was formally opened on July 28. The store, which is located at No. 378 East Water street, is one of the finest equipped electrical supply stores in Milwaukee. It is in charge of Mr. A. C. Keene.

The accompanying illustration shows the exterior



New Western Electric Store in Milwaukee.

of the new store, which is a four-story and basement building, devoted exclusively to displaying and storing telephone and power apparatus and electrical supplies of every description. The growth of business in Milwaukee led to the establishment of the fine new quarters.

The construction department of the Safety Insulated Wire and Cable Company has been awarded a contract by the Middletown Gas and Electric Light Company, Middletown, Ohio, for laying underground electrical conduits and installing cables in that city for approximately $12,000. Work is progressing rapidly and the company expects to operate part of the system by September 1. The company also has been awarded a contract for laying electrical underground conduits for the city of New Britain, Conn. for approximately $14,050.

Western Electric Sales Increased

The Western Electric Company reports that the increase in business for July, 1910, over July, 1909, was somewhat better than the average increase of the seven months of the fiscal year that have elapsed, and the year so far is well up to the $61,000,000 prediction for the twelve months made some time ago. July showed a gain of about 50 per cent over the same month a year ago. No sales of especial magnitude were booked, business running evenly and being well distributed.

The inter-phone branch of the company's business is especially active, while the manufacture of telephone apparatus for train despatching is rapidly increasing. This spring the company tested on the Pennsylvania railroad an improved selector for use in train despatching. Results were so satisfactory that the new apparatus has already been installed on the Pennsylvania, New York Central, Atchison, and Great Northern roads. To meet the increase in business the Western Electric has increased its staff and now employs 23,000 persons.

Less surprise would be manifested in the record-breaking copper consumption of the current year if it were taken into consideration that, in conjunction with unusual activity in brass lines, the five largest electrical companies in the world are operating at close to top-notch totals. The following table gives their estimated gross sales for the current year:

General Electric	$70,000,000
Western Electric	61,000,000
Allegemeine Electricitat Gesellschaft	55,000,000
Siemens & Halske	50,000,000
Westinghouse	30,000,000

Speed in Filling Emergency Orders

At three o'clock the morning of June 30, the officials of the Wymore Telephone company, Wymore, Nebraska, advised the Western Electric company that their town had been partially destroyed by fire and that the telephone switchboard was a total loss.

By eleven o'clock of the same morning, the Hawthorne factory had their order for a complete exchange, consisting of terminal equipment and power plant, for three subscriber's switchboard sections having equipment for 500 lines and one toll switchboard. All material was shipped by express, the frames leaving on July 1 and the cabling on July 2. A number of installers had been sent on the job, supervised by an expert installing engineer.

The exchange was completed and cut over at 3 A. M., July 8, exactly eight days after the Western Electric company were given the order. This exchange was the first building to be re-occupied after the fire, which is the result of the excellent facilities of the Western Electric company for handling emergency orders. Numerous fire jobs of this nature have been handled in the past few years by this company, the most notable being the rehabilitation of the Paris exchange in sixty days.

The Western Electric company reports that during the past twenty months it has sold over a quarter of a million of the No. 1317 type rural telephones. This is an unprecedented figure for these sales, and it is a certain indication that the rural telephone movement is progressing rapidly.

Switchboard Bulletin Issued

The Western Electric company has just issued its bulletin No. 1004, describing central battery, non-multiple switchboards with lamp signals. The switchboards presented in this publication are those which are recommended for exchanges where the ultimate number of subscribers' lines will not exceed 500, and a central battery system is required with or without magneto toll or rural line connections.

The bulletin, which contains twenty pages, is illustrated with numerous diagrams and half-tones and contains considerable technical information on the points of this particular style of telephone switchboard. Separate sections are given over to central battery line circuit apparatus, magneto toll, or rural line circuit apparatus, central battery and construction cord circuit apparatus, operator's telephone circuit apparatus, ringing and night alarm circuit apparatus, switching keys, transfer circuits, wiring and cabling.

A Booklet on Enameled Wire

The American Electric Fuse Company has published a book entitled, "Enameled Magnet Wire." It is not a big book, but it contains a lot of interesting reading in its forty-four pages, to say nothing of a dozen beautiful half-tone views of the company's works and a lot of diagrams and apparatus cuts. It tells some things about enameled wire that not everyone knows, and its records of tests, formulas and tables are valuable. The booklet is, of course, free to telephone workers.

Western Union Building Railway Telephone Line

The Western Union Telegraph Company is building a double line, copper wire telephone and telegraph service from Wichita to Amarillo, Texas. The line is completed as far as Woodward, Okla., on the Panhandle branch of the Santa Fe. The improvement is being made so that the Western Union will be able to reach by wire those towns along the Panhandle line in which the Santa Fe does not keep a telegraph operator. Telephones will be placed in the several depots in lieu of telegraph instruments.

Matthews' Rings

Readers of the article on another page, entitled "Methods of Interior Block Distribution," will observe that the distributing rings referred to and illustrated are the well-known type made by W. N. Matthews & Brother, and we are indebted to that concern for the data and cuts used.

Mr. M. S. Sperry, in charge of the pole department and correspondent for the Kellogg Switchboard and Supply Company, will leave August 1 to accept a position with a well-known Milwaukee lumber firm, McGillis & Gibbs Company, Wells building.

"Electrical Wires" is the title of a booklet issued by the Rome Wire Company, Rome, N. Y. It contains information and tables about every variety of electrical wire, the illustrations being beautifully done in natural colors.

Inspecting and Testing Telephone Sets

By E. A. Hawkins

THE marked efficiency of the standard telephone sets which are being manufactured today is the result of the high standards for inspection which have been set by the leading manufacturers. Experience has taught the manufacturers the necessity for exercising more than usual caution in connection with the manufacture of the telephone, in order to prevent subsequent losses both to themselves and to their customers when called upon to replace equipment which has fallen down in service. In the factory of the Western Electric Company, for instance, are to be found more than 1,000 employees engaged solely in the work of testing and inspecting telephone apparatus.

Fig. 1. Inspection of Raw Materials.

On all but commercially standard material, such as screws, hinges, sheet brass, etc., suppliers must furnish material made exactly in accordance with specifications written expressly for this purpose. Immediately upon receipt, all material ordered according to these specifications is weighed, counted or gauged, and samples are sent to the shop laboratory (Fig. 1) for chemical analysis to determine whether they conform to the specifications.

This is a test of fundamentals, and one without which the remainder of the inspection and testing operations would be of no value. Raw materials must be satisfactory before manufacturing commences.

In connection with the entire process of manufacture a certain percentage of every lot of parts which finally goes into the assembled finished apparatus is minutely inspected between all operations. Inspection of all apparatus is made to see that assembly is performed properly, that every necessary part is used, all screws are inserted properly and that every adjustment and delicate arrangement is correctly made. Inspectors work from both specifications and drawings.

The inspection of telephone sets covers a great many separate and distinct operations. First, an inspector sees that each set has its proper code number. The interior of the set is inspected to see that everything is in its proper place, and then the set is given a general inspection. The apparatus must be correctly mounted, and wires and cable are examined to see whether they are properly laid. The visual check inspection follows, and the set is compared with an approved blueprint. Circuits and open coils are tested. A 500-volt break-down test is given to see whether any crosses exist between insulated points.

After this the tester takes hold. He tests the ringer to see that it is properly adjusted and that its operation is smooth. He examines the contacts of the switch-hook and generator. When his work is finished the set is again inspected by another group to see that the transmitter is properly mounted, the screws well driven home, not stripped, and the auxiliary details, such as mounting screws, battery connectors, etc., placed in the battery box of the set if it happens to be a local battery set.

By means of automatic testing boards, tests are applied to determine whether the circuits are continuous, whether there are any grounds or crosses, the condition of the condenser and of the induction coil, the resistance of the ringer and the output of the ringer and generator under minimum and maximum service conditions.

These tests would ordinarily protect any instrument which required readjustment, but the work of inspection and testing is not yet completed. The group of check inspectors select sets at random and go over them carefully with drawings and specifications to provide a fur-

Fig. 4. View in Physical Laboratory.

ther safeguard against error or defect. The work of these check inspectors follows up the labors of the inspectors who have gone before, besides being a lookout for possible mistakes in important parts of the apparatus.

Before shipment is finally made skilled inspectors from the engineering department step in and go over a portion of the work passed by the manufacturing department.

Fig. 4 illustrates one section of the Western Electric Company's very complete physical laboratory which was originally equipped at an expense of several hundred thousand dollars and is operated solely as an experimental shop at an annual expense that averages above $75,000. Here, new devices are being developed, modifications of old designs worked out and continuous tests carried on with apparatus of other makes.

Exhaustive records are kept showing results of investigations into practically every phase of the telephone art, past and present, so that inquiries from customers as to whether this device or that device will work can be answered immediately.

It should be a great source of satisfaction to the operating companies to know that the manufacturers today are taking such pains in the manufcature of telephone apparatus, and at the same time are carrying on such exhaustive studies in the hopes of perfecting and simplifying the telephone art.

Chicago Subway Making Progress

Interests identified with the Chicago Subway Company state that there will be no assessment levied upon the stockholders in the reorganization of the corporation. It is stated that the development of the telephone system will furnish immediate revenues of ample amount to cover the running expenses of the property. The floating indebtedness, consisting of the receiver's certificates sold to cover the cost of telephone development, probably will be refunded by an issue of bonds which will be made large enough to include liquidation of the loans advanced to the company by Harriman-Armour interests, and which are secured by the company's present first mortgage bonds. It has been decided that the company will not stop at the required 20,000 telephones, but will push the installation to the full limit. The work is being pushed ahead vigorously and it is expected that the 20,000 telephones will have been passed by a liberal margin before the end of the present year.

Estimates are furnished showing that with 40,000 telephones in operation the company can pay all of its operating expenses, interest on the present amount of bonds outstanding, and have a small surplus applicable to the stock. Added to the returns from freight traffic in the tunnels company interests figure that the revenue should round out a very substantial amount within the next year or eighteen months.

It is pointed out that at current prices for the stock and bonds of the Subway company the market represents less than 40 per cent of the actual money that has been put into the property to develop the automatic telephone system.

Seattle Investigating Telephone Values

The Department of Public Utilities of the city of Seattle, Wash., has employed Mr. Frank B. Hall, of Wheeling, W. Va., and Mr. C. H. Judson to investigate the values of the two telephone plants of that city; *i. e.*, Pacific Telehpone & Telegraph company and the Independent Telephone company of Seattle, and to make inquiry into the rates charged by the companies for the purpose of ascertaining, if possible, whether or not the companies are at present charging fair and equitable rates, and whether it is possible for them to continue to pay dividends on the present rate, or whether it is possible for them to reduce the rates and conduct a profitable business.

The result of this investigation will be brought to the attention of the Washington Railroad Commission, which body will hold a hearing on the case at Seattle on September 26, being an adjournment from a hearing held July 18, at which time report of the engineer of the Railroad Commission upon the Independent Telephone company was presented.

Brevities of the Business

PERSONAL NOTES.

Gerard Swope, general sales manager of the Western Electric Company, has just returned from a three months' tour of Europe.

H. T. Doolittle, formerly of the Sterling Electric Company, Lafayette, Ind., has joined the sales department of the Diamond Rubber Company, Chicago.

H. R. Van Deventer, of the Sumter Telephone Manufacturing Company, well known in the telephone field as the author of "Telephonology," has been suffering from an attack of typhoid fever at his home, Sumter, S. C. We are informed, however, that Mr. Van Deventer is getting along very nicely and his friends look forward to his speedy recovery.

A. J. Rosenberger, sales engineer for the Monarch Telephone Manufacturing Company, is now in Philadelphia in the interests of "Telephone Time."

Hiram D. Currier, who has been connected with the New York offices of the Duplex Metals Company, has returned to Chicago and will represent the wire end of the company's business in that territory.

A. G. Mackenzie has been appointed division commercial superintendent of the Hurd division of the Rocky Mountain Bell Telephone Company with headquarters at Helena, Mont. For some time Mr. Mackenzie has been acting as publicity agent for the company, having his headquarters at Salt Lake City.

C. P. Cockerill has been appointed manager of the Mapleton Telephone Company, Mapleton, Iowa, to succeed J. C. Hammond, resigned.

J. A. Wynes, formerly wire chief for the Home Telephone Company, Canton, Ill., has been promoted to the position of manager for the company.

R. W. Keely, Atlanta, Ga., has assumed the management of the Southern Bell Telephone Company's exchange at Pensacola, Fla., succeeding A. C. Hobson, who has accepted the management of the company's exchange at Columbia, S. C.

Charles M. Nininger has been appointed district commercial manager for the Southern Bell Telephone Company, Atlanta, Ga.

F. H. McKnight of the firm of J. P. Morgan & Company, has been elected director of the United States Telephone Company to succeed E. G. Tillottson, resigned.

Bela Gati, engineer-in-chief of the Hungarian telegraphs and telephones, is engaged in the development of telephone apparatus with which he hopes to be able to establish communication between London and Constantinople. He has produced a water-

cooled microphone which takes one ampere of current and with which he has been able to secure excellent results over 2,500 kilometers of line.

John Fletcher has been appointed superintendent of telegraph for the Canadian Pacific Railway at Vancouver, having been promoted from the position of chief operator.

Carl Brunow has been elected manager of the Seymour Mutual Telephone Company, Seymour, Ind.

Dwight E. Sapp, an attorney of Mt. Vernon, Ohio, quite extensively known in the independent telephone field, especially of that state, being largely interested in the Citizens' Telephone Company and other independent interests, died in that city recently as the result of an operation for appendicitis.

G. W. Babbitt, chief train dispatcher for the Michigan Central raliroad at St. Thomas, Ont., died July 12, at the age of sixty-seven.

C. A. Parker has resigned his position as superinendent of telegraph of the Denver, Northwestern & Pacific railroad.

J. H. Lindsey, formerly connected with the Northern Railway of Costa Rico, Port Liman, Costa Rico, in the capacity of superintendent of telegraph, is now connected with the Union Switch & Signal Company, Springfield, Mo.

On account of ill health, J. L. Orbison, superintendent of telegraph of the Cincinnati, Hamilton and Dayton railroad has been granted an indefinite leave of absence.

W. C. Poage, Houston, Tex., has been appointed division plant superintendent of the Southwestern Telegraph & Telephone Company with headquarters at Little Rock, Arkansas, to succeed Fred Linnington, who has accepted a similar position at Fort Worth, Texas.

J. W. Hight, Sioux Falls, S. D., has been appointed manager of the Spencer Telephone Company of Spencer, S. D.

J. Norwood has been appointed manager of the Southwestern Telegraph & Telephone Company at Goliad, Texas.

E. H. Hefferman, Sacramento, Cal., has been appointed district commercial manager of the Pacific Telephone and Telegraph Company, with headquarters at Reno, Nev., to succeed J. F. Adams, who has resigned to accept the general management of the Nevada-California-Oregon Telephone & Telegraph Company with offices at Rena, Plumes, Junction, Amedee, Hot Springs, and Doyle.

H. A. Ball, formerly manager of the Gibson Home Telephone Company, Gibson City, Ill., has been appointed manager of the Central Telephone and Telegraph Company of Paxton, Ill.

Edward Kelso is the new manager of the Nebraska Telephone Company's exchange at Grand Island, Neb.,

S. D. Lucas has been appointed special agent for the Bell Telephone & Telegraph Company, with headquarters at Charlotte, N. C.

D. E. Whipple, formerly manager of the Western branch of the North Electric Company, at Kansas City, has been appointed general sales manager of the company with his headquarters at Cleveland.

C. W. Barton has been appointed commercial manager of the Pacific Telephone and Telegraph Company at Riverside, Cal., to succeed G. M. Huntoon, who gives up the local work to devote his entire time to the business of district manager. For the past five and a half years, Mr. Huntoon has been taking care of both the district and local office. The district includes the exchanges at Riverside, San Bernardino, Colton, Highland, Rialto, Uplands, Ontario and Pamona.

Edwin F. Carter has been appointed commercial manager of the Bell Telephone Company at St. Louis. Mr. Carter has been in the company's employ ten years, entering as an inspector and working up to the important office which he now occupies. While acting in the capacity of contract agent he was able to bring about many reforms in all branches of the service. Through his recommendation the telephone rates were greatly reduced and as a result the number of subscribers was increased 43,279 to 54,370 in a little over a year's time.

Leigh S. Keith, for a number of years one of the general engineering staff of the New York Telephone Company and for the past year connected with the firm of McMeen and Miller, Chicago, was married July 25 to Miss Jeannette Munroe, of Everette, Mass.

E. J. Wenner, a leading young attorney of Waterloo, Iowa, who makes his first appearance in Telephone Engineer this month, having been secured to conduct the legal department for our publication, was married August 17 to Miss Elizabeth Parrott, daughter of W. F. Parrott, of the *Waterloo Daily Reporter*.

IN THE MARKET.

HINDMAN, KY.—The Hindman-Carr Telephone Company is securing franchises for the construction of a local, independent telephone line from Hindman via Vest to Ball's Fork, fifteen miles, where connections will be made with long distance lines to Jackson, Ky. Construction material will be needed. Address, Hindmann-Carr Telephone Company, Hindman, Ky.

BENTLEY, KY.—Booker E. Venters and others are preparing to build a telephone system in Bentley. All the construction material necessary will be needed. Address, Booker E. Venters, Bentley, Ky.

JESSE, KY.—The Mace Home Telephone Company is being organized here by F. M. Cornette and others; capital stock, $500. To build a telephone system in Jesse, also lines to Hazard and Viper. Construction material will be needed. Address, F. M. Cornette, manager, the Mace Home Telephone Company, Jesse, Ky.

CREECH, KY.—J. C. Creech and others will establish a telephone system in Creech and build a local, independent line from Creech via Evans to Harlan, 17 miles. A complete line of construction material will be needed. Address, J. C. Creech, Creech, Ky.

CRAB ORCHARD, KY.—The Lincoln County Home Telephone Company here has increased its capital stock from $2,000 to $3,000 and will build extensions over the county. The most important line will be constructed from Crab Orchard to Stanford, 20 miles, to establish long distance connection. A full line of construction material will be needed. Address, the Lincoln County Home Telephone Company, Crab Orchard, Ky.

GRAYSON, KY.—The Carter County Telephone Company here has increased its capital stock from $3,500 to $4,000 and announces some increases and improvements of its lines. A franchise is being secured for a line from Grayson via Leon and Willard to Olive Hill, Ky., where long distance connections will be established with Cincinnati. Other much-needed improvements will be made. Construction material will be needed. Address, the Carter County Telephone Company, Grayson, Ky.

BLAINE, KY.—Robert Phelan and others will build a telephone exchange in Blaine and construct system in Lawrence county in a section having no telephones. Farmers' lines especially will be established. Material will be needed. Address Robert Phelan, Blaine, Ky.

WHITESBURG, KY.—The Whitesburg Telephone Company here makes the announcement that it will build a metallic line from Whitesburg via Cumberland river and Eolia to Stonega, Va., 25 miles, to connect with the Western Union Telegraph Company. Construction material will be needed. Address, J. L. Comann, manager, Whitesburg Telephone Company, Whitesburg, Ky.

EOLIA, KY.—Upper Cumberland River Telephone Company is making some improvements upon their lines and is securing franchises for the construction of local independent lines from Est to Looney Creek and from Est to Poor Fork and Harlan. Construction material will be needed. Address, Upper Cumberland River Telephone Company, Eolia, Ky.

HARLAN, KY.—The Harlan Telephone Company is securing right-of-way for the construction of a local, independent line from Harlan to Evarts, 20 miles. Construction material will be needed. Address, Harlan Telephone Company, Harlan, Ky.

GOODLOE, KY.—The Goodloe Telephone Company is being organized here by Frank Hughes, R. F. Horton and others with a capital stock of $500, for the purpose of building a telephone system in Goodloe. Material will be needed. Address, R. F. Horton, manager, the Goodloe Telephone Company, Goodloe, Ky.

PINEVILLE, KY.—Bell County Home Telephone Company is securing franchises for the construction of a local, independent line from Pineville to Straight Creek mines and from Pineville to Harlan, Ky., 40 miles. A full line of construction material will be needed. Address, Bell County Home Telephone Company, Pineville, Ky.

WINCHESTER, KY.—The Central Home Telephone Company here has secured right-of-way for the construction of local, independent telephone lines from Winchester to Valley View, Ky., and from Winchester to Athol, Ky., which will make important connections. Besides the construction material two switchboards will be needed. Address, Central Home Telephone Company, Winchester, Ky.

WHITESBURG, KY.—J. L. Comann and others here have plans under way to build a local and long distance telephone line from Stonega, Va. via Whitesburg, Colson and Hindman to Jackson,

Ky., 85 miles, forming perhaps one of the most important connections ever constructed in Kentucky. Material will be needed. Address, J. L. Comann, Whitesburg, Ky.

NEW TELEPHONE COMPANIES.

SULPHUR SPRINGS, ARK.—The Sulphur Springs Telephone Company has been incorporated with a capital stock of $25,000 by Clyde W. Penwell, Le Roy Penwell, and Louis Kenworthy.

OCALA, FLA.—Articles of incorporation have been filed for the Marion County Telephone Cmpany with a capital stock of $10,000. Th officers are as follows: President, W. N. Camp; vice-president, J. R. Williams; secretary, D. S. Woodrow; treasurer, Edward Holder.

CALDWELL, IDAHO.—The Homestead Rural Telephone Company is the name of a new organization incorporated in this place by W. H. Davis, A. W. Smith, W. P. Laws, John Janssen, W. H. Cutler, F. B. Faris, Charles Vogt, John F. Pemberton, and W. R. Fisher.

KIMBERLY, IDAHO.—A charter had been granted the Kimberly Telephone Company. The capital stock is $50,000 and the directors are: W. H. Turner, N. W. Swearingen, W. S. Martin, W. E. Lewis, Ed Claiborn, F. E. Bigger and W. F. Breckon.

ORIFINO, IDAHO.—Articles of incorporation have been filed for the Clearwater Telephone & Telegraph Company with a capital stock of $40,000. The incorporators are S. Snyder, O. A. Anderson, Frank A. Jones, James M. McConicey and James M. Fairly. It is the purpose of the company to extend its service to all points in the Clearwater basin and Nez Perce prairie.

TEXARKANA, ARK.—The Arkansas & Texas Telephone & Telegraph Company has been incorporated with a capital stock of $25,000. A. C. Stuart is president of the company.

LITCHFIELD, ILL.—B. M. Burke, F. W. Burton and W. R. Hulse are the incorporators of the Litchfield Telephone Company, recently incorporated in this place with a capital stock of $30,000.

SMITHVILLE, ILL.—Articles of incorporation have been filed for the Smithville Telephone Company with a capital stock of $2,400. The incorporators are R. A. Stewart, Edgar Harper, Luther Couch and James M. Smith.

SEYMOUR, IND.—The Jennings & Jackson County Telephone Company is the name of a new organization incorporated with a capital stock of $3,000 by Andrew Seibert, Michael Hunt, William Kessler, Jacob Noll, Clayton Downs and Frank Hill.

BOSWELL, IND.—Articles of incorporation have been filed for the Boswell Telephone Company with a capital stock of $20,000. The incorporators are Ray Keys, Henry Hinkle, Ezra Eberhardt, C. E. McDaniels of Boswell and Robert W. Edmonds, of Fowler.

PITTSBORO, IND.—The Home Telephone Company has been organized at this place with a capital stock of $3,000 and the directors are J. D. Gentry, J. F. Leonard, W. E. Beaman, W. M. Dillon and C. O. Surber.

MISSOURI VALLEY, IOWA.—Articles of incorporation have been filed for the Rural Telephone Company with a capital stock of $10,000 and the incorporators of the company are I. E. Jones, A. A. Greene, George Weed, H. Fitzgibbon, Oscar Doty, J. W. Daugherty and Wilson Doty.

HUBBARD, IOWA.—The Hubbard Mutual Telephone Company has been incorporated and the following are the officers: President, R. R. Swallum; vice-president, W. R. Thompson; secretary, G. Lang; treasurer, D. E. Byam. The capital stock is $10,000.

WASIOTO, KY.—B. N. Worthington and others have organized the Cumberland River Telephone & Telegraph Company with a capital stock of $25,000.

LAKE CHARLES, LA.—Articles of incorporation have been filed for the North Calcasieu Telephone Company with a capital stock of $10,000. The officers of the company are President, W. B. Welborn, Jr.; vice-president, M. A. Shirley; secretary, C. M. Green; treasurer, S. J. Andrews.

LOVELL, MAINE.—The West Oxford Telephone Company has been incorporated with a capital stock of $5,000 by Geo. W. Andrews, W. S. Fox, Victor H. McAlaster, D. E. McAlaster, F. S. Stearns, William H. Smith, John A. Fox, Alexander Laroque, A. Lord, G. C. Lord, Mandall A. Le Baron, Z. McAlaster, R. A. Le Baron.

ROBBIN, MICH.—Articles of incorporation have been filed for the Robbin Rural Telephone Company with a capital stock of $3,500 by Louis E. Johnson, Andrew Hanson, B. E. Herseth, and Gust Johnson.

LANSING, MICH.—Articles of incorporation have been filed for the Lenawee County Telephone Company with a capital stock of $150,000, being a merger of the Adrian Telephone Company and the Michigan State Telephone Company. An inventory of the plants showed them to be worth $150,000.

HUBBARD, MINN.—E. R. Hinds, president; G. W. Pike, vice-president; H. F. Delaney, secretary; George Nye, treasurer, all of Hubbard and C. L. Potter, of Park Rapids are the incorporators of the Park Rapids and Eastern Telephone Company, which was recently incorporated with a capital stock of $10,000.

FORBES, MO.—Articles of incorporation have been filed for the Business Men's Telephone Company by Elmer Siper, H. E. Milne, G. T. Metcalf and others with a capital stock of $3,000.

VALENTINE, NEB.—A charter has been granted the Stockgrowers' Telephone Company with a capital stock of $10,000. The incorporators are W. S. Barker, G. A. Chapman, and Woodruff Bell.

THOMASVILLE, N. C.—The Lee Telephone Company was recently incorporated at this place with a capital stock of $10,000.

MCCONNELLSVILLE, OHIO.—Articles of incorporation have been filed for the Citizens' Telephone Company with a capital stock of $20,000 by T. J. Bailey, R. A. Kennard, James Donahue, and M. D. Harris.

KEMPTON, PA.—Application has been made for a charter for the Berks and Lehigh Telegraph and Telephone Company with headquarters at this place. The new company will be capitalized at $10,000. The incorporators are William Y. Fetheroff, Jesse M. Lengel, Elmer J. Bachman, Edgar Greenawald and James S. Focht, the latter being secretary and treasurer of the company.

BURGETTSTOWN, PA.—The Burgettstown Farmers' Telephone Company has been incorporated with an authorized capital stock of $5,000. The incorporators are G. S. Pate, Lee R. Scott, and J. V. Welch, the latter being treasurer of the company.

CHERRY RIDGE, PA.—The Cherry Ridge and Wangum Telephone Company is the name of a new organization recently incorporated by Clifford Gray, Wm. Rowe, John Male and John Spinner, with a capital stock of $5,000. Mr. Spinner is treasurer of the company.

MCCONNELLSVILLE, S. C.—Articles have been filed for the incorporation of the McConnellsville Telephone Company with a capital stock of $5,000. The incorporators are J. F. Ashe, J. O. Moore, and J. H. Williams. J. T. Crawford will have charge of the construction work.

OKOBOJO, S. D.—Articles have been filed for the Little Bend Onida Telephone Company with a capital stock of $24,000. The incorporators are H. P. Knox, Little Bend; W. H. Green and W. E. Jenkins, Okobojo; O. E. French and Frank Hoyes, Onida.

PIERRE, S. D.—Application has been made for a charter for the Pierre Co-operative Telephone Company with a capital stock of $10,000. The incorporators are A. C. Brink, L. J. Dutcher and B. S. Payne.

SOUTH SHORE, S. D.—The Dexter-Germantown Telephone Company is the name of a new company recently incorporated with a capital stock of $20,000 by E. C. Ellingson, Arthur Klix, Robert Naldnen, and Martin Amdahl.

KODAKA, S. D.—Otto S. Sharon, F. Rounds and J. P. Serr have applied for a charter for the Farmers' Telephone Company. The capital stock is $25,000.

BUFFALO RIDGE, VA.—The Buffalo Ridge Telephone Company has been incorporated with a capital stock of $5,000. The incorporators, C. A. DeHart, Buffalo Ridge; J. A. Nolen, Jr., Evansville; J. B. Bramer, Woolwine.

DETROIT, MICH.—A movement is on foot, in fact it is claimed the deal has been consummated with the exception of the arrangement of minor details, for the formation of a $4,000,000 independent telephone company comprised of 14 smaller independent telephone companies. This is said to be the first step toward consolidating the 221 independent telephone companies in the state into three big organizations with headquarters at Detroit, Grand Rapids and another city yet to be selected. The new corporation will be known as the Home Telephone Company of Michigan, and will have its headquarters in Detroit and will be affiliated with the local independent company. The deal is being financed by the Commonwealth Trust Company of St. Louis, backed by the Fausts and the Koeblers, brewing interests of that city. This move is regarded as the beginning of really efficient co-operation among independent companies in Michigan.

DENVER, PA.—A new telephone company has been organized at this place which will be known as the Denver and Ephrata Telephone Company. The capital stock of the company is $25,000. Silas E. Bard is president of the company and Alvin W. Mentzer secretary. The line will be built to Reinholds, Blainesport, Cocalico, Mt. Airy, Schoeneck, Durlach, Bowmanstown, Lincoln, Red Run, Adamstown and other small towns.